THE BLUEJACKETS' MANUAL

1944

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The
Bluejackets'
Manual

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UNITED STATES NAVY

1944

Twelfth Edition

United States Naval Institute
Annapolis, Maryland
1944

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by

U. S. Naval Institute
Annapolis, Maryland

THE SECRETARY OF THE NAVY
Washington, D.C.

THE *Bluejackets' Manual,* originally prepared in 1902 by Lieutenant Ridley McLean, United States Navy, and revised in 1914, 1916, 1922, and 1927, has been revised again by the United States Naval Institute as authorized and approved by the Bureau of Navigation. The training courses of the Bureau of Navigation have furnished a medium for issuing information of a specialized or technical character to the service. The purpose of this revision has been to modernize the manual so that it agrees in substance with the latest training courses and includes such other information as would tend to make an able seaman and a thorough man-of-war's man.

The *Manual* is divided in the following parts:

Part I. For the recruit.

Part II. (A to N) The subjects which every man on board ship should know.

Part III. Rudimentary seamanship and gunnery.

Part IV. Advanced seamanship and gunnery.

Part V. Physical drills.

Part VI. Landing force.

Part VII. Miscellaneous.

The chapters in the *Bluejackets' Manual* which give the details of the manual of arms, infantry, artillery, extended order, and landing force are sections of the revised *Landing Force Manual* which have not yet been printed.

WILLIAM D. LEAHY
Acting

March, 1938

FOREWORD TO NINTH EDITION (REVISED)

This revised edition is necessary because of the changes in the landing force regulations; otherwise, except for a few minor corrections, it is the same as the eighth edition published in 1938.

G. V. STEWART
Captain, U. S. Navy
Secretary-Treasurer
U. S. Naval Institute

ANNAPOLIS, MARYLAND
April, 1939

FOREWORD TO TENTH EDITION

This tenth edition has become necessary by the Navy's adoption of the U. S. Army's drill regulations and the desirability of new type setting for clearness of print. As compared with the ninth edition (revised) the following changes should be noted:

Chapters 7, 8, and 9 now accord with the close order drill of the U. S. Army.

Chapter 41, "Artillery: School of the Platoon," has been replaced by "Cart Drill."

Chapter 51, "Artillery: 75-mm. Pack Howitzer," has been omitted because that weapon will no longer be carried aboard ship.

G. V. Stewart
Captain, U. S. Navy
Secretary-Treasurer
U. S. Naval Institute

Annapolis, Maryland
June, 1940

FOREWORD TO ELEVENTH EDITION

A complete revision of the *Bluejackets' Manual* has been undertaken in order to eliminate obsolete material and to freshen the contents to suit the needs of the Navy at war. An opportunity is thus provided to alter the arrangement to permit easy location of subjects, a facility previously lacking. The *Bluejackets' Manual* furnishes information of interest to all bluejackets concerning their daily life aboard ship.

A. T. Church
Rear Admiral, U. S. Navy (Ret.)
Secretary-Treasurer
U. S. Naval Institute

Annapolis, Maryland
September, 1943

Introduction

In the forty-two years between the first and twelfth editions of the *Bluejackets' Manual*, this book has been a source of practical information for several generations of seamen. During this period this book has been changed frequently to keep it up-to-date and improve its usefulness. The changes, however, have not altered the fundamental purpose of the manual.

In the twelfth edition further extensive changes have been made to bring the book into better adjustment with the needs of the times. Considerable overtechnical matter has been eliminated, the organization revised, a new glossary added, and the index expanded and cross-referenced. Obsolete text matter has been brought up-to-date and new material of current interest has been included. The many new illustrations serve to clarify text matter and convey the spirit of the Navy at war.

These revisions are intended to improve the usefulness of the manual both as a training text and reference source for bluejackets. At the same time, the basic features of the book which have met the test of time are preserved and strengthened.

This edition is the result of cooperative effort on the part of training officers at U. S. Naval Training Centers and the Bureau of Naval Personnel.

J. L. HOLLOWAY, JR.
Captain, U. S. Navy
Director of Training
Bureau of Naval Personnel
April 1944.

NATIONAL ANTHEM

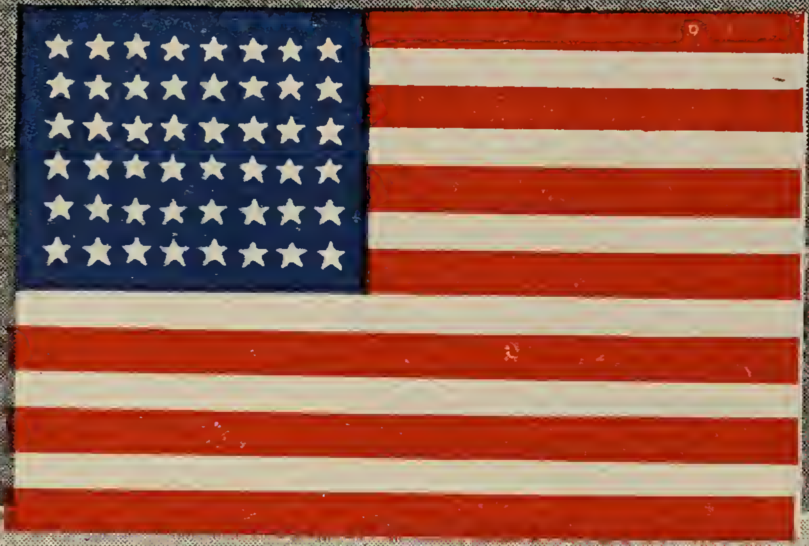
THE STAR-SPANGLED BANNER

Oh, say, can you see, by the dawn's early light,
  What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars, thro' the perilous fight,
  O'er the ramparts we watched, were so gallantly streaming.
And the rockets' red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there.
  Oh, say, does that star-spangled banner yet wave
  O'er the land of the free and the home of the brave?

On the shore dimly seen, thro' the mists of the deep,
  Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
  As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected, now shines on the stream;
  'Tis the star-spangled banner; oh, long may it wave
  O'er the land of the free and the home of the brave.

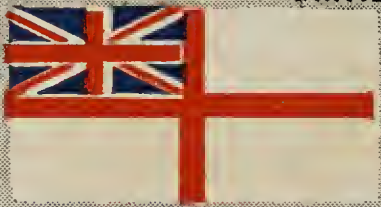
Oh, thus be it ever when freemen shall stand
  Between their loved home and the war's desolation;
Blest with vict'ry and peace, may the heav'n-rescued land
  Praise the Power that has made and preserved us a nation.
Then conquer we must, when our cause it is just,
And this be our motto: "In God is our trust";
  And the star-spangled banner in triumph shall wave
  O'er the land of the free and the home of the brave.

FLAGS OF



UNITED STATES
MAN-OF-WAR • MERCHANT

BRITISH EMPIRE



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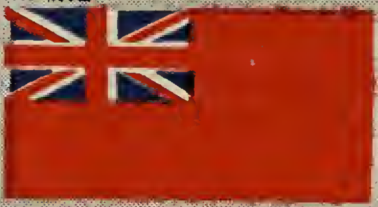
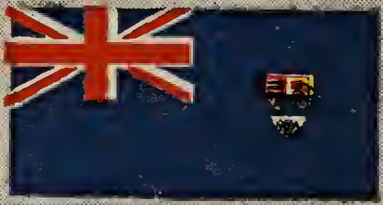


RED ENSIGN • MERCHANT

CANADA



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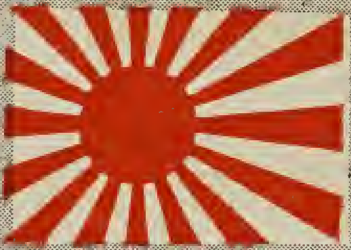

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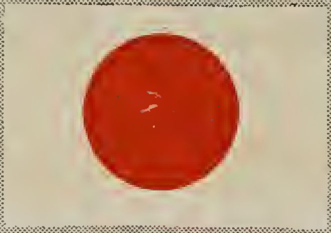
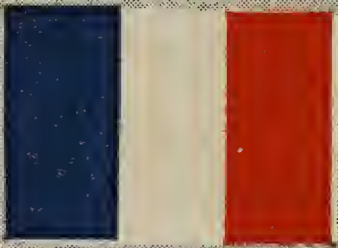


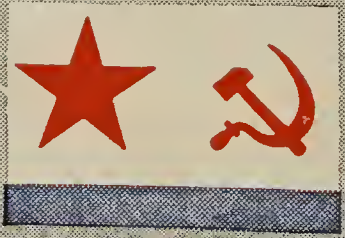
MERCHANT • JACK

FRANCE



ENSIGN • MERCHANT

U. S. S. R.



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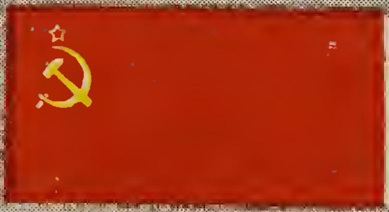
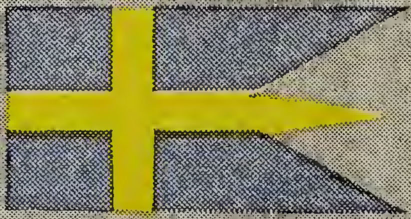


NATIONAL • MERCHANT

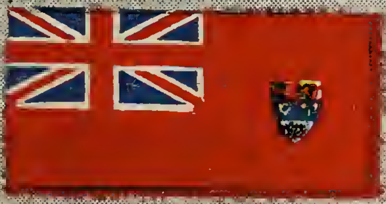
SWEDEN



ENSIGN • JACK

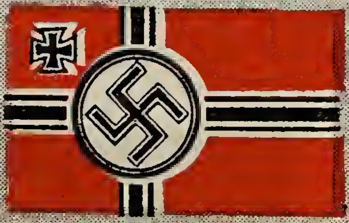
PRINCIPAL MARITIME NATIONS

CANADA



MERCHANT

GERMANY



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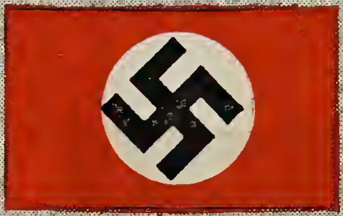
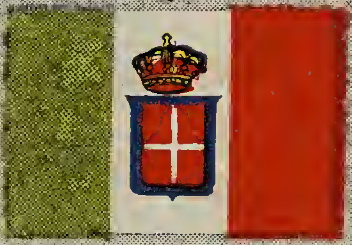


NATIONAL • MERCHANT • JACK

ITALY



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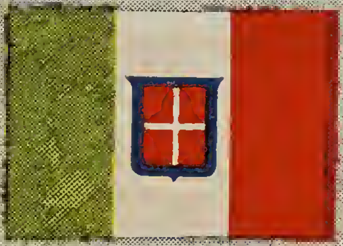

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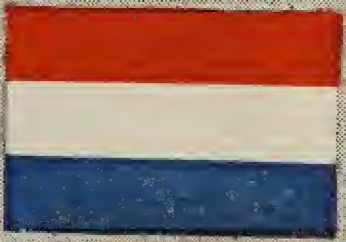

ENSIGN • NATIONAL • MERCHANT

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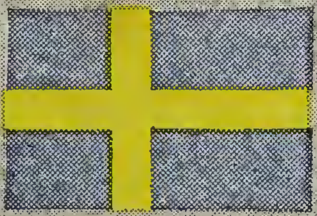
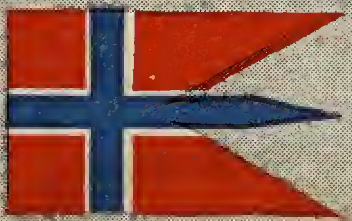


NATIONAL • MERCHANT

NORWAY



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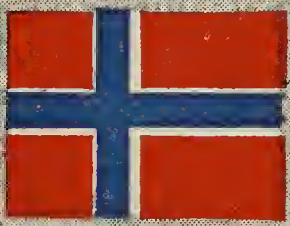
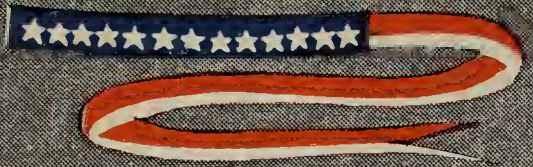
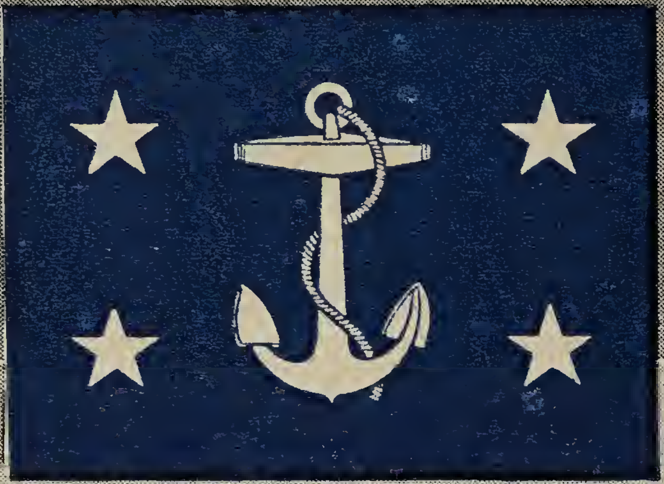


MERCHANT

DISTINCTIVE FLAGS


COMMISSION PENNANT U. S. NAVY 13 STARS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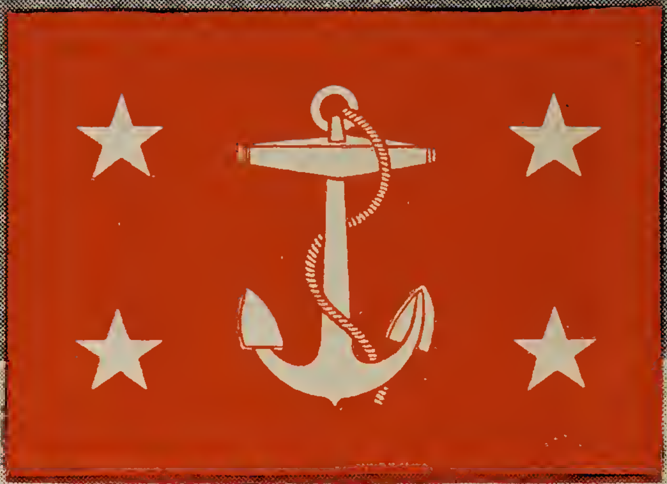
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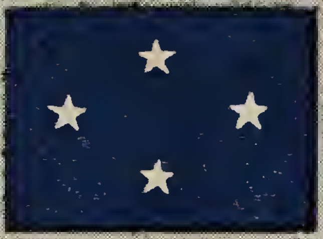
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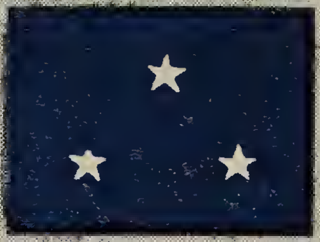
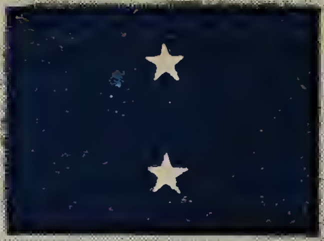

VICE ADMIRAL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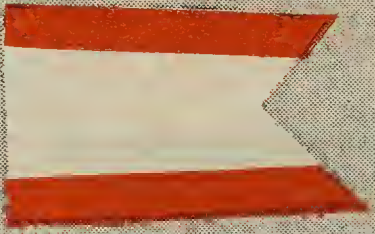
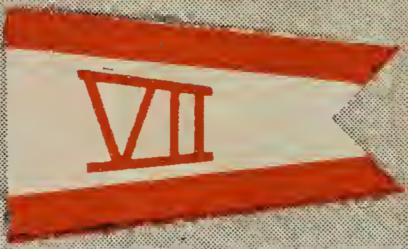
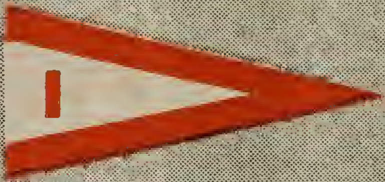
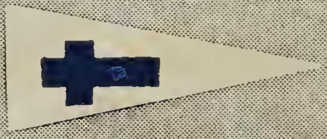

NAVAL DISTRICT • FORCE COMDR.



NAVAL DISTRICT • SECTION COMDR.



NAVAL DISTRICT • DIVISION COMDR.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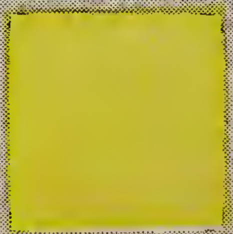
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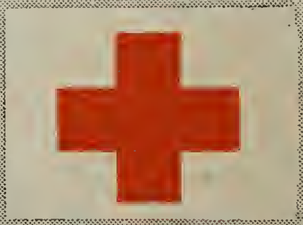
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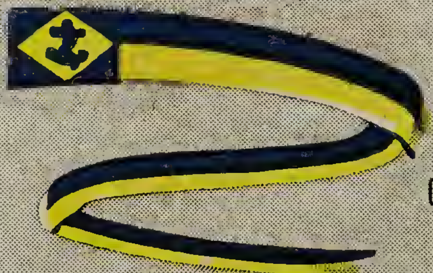
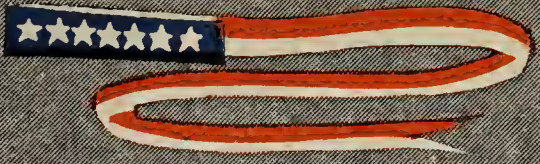
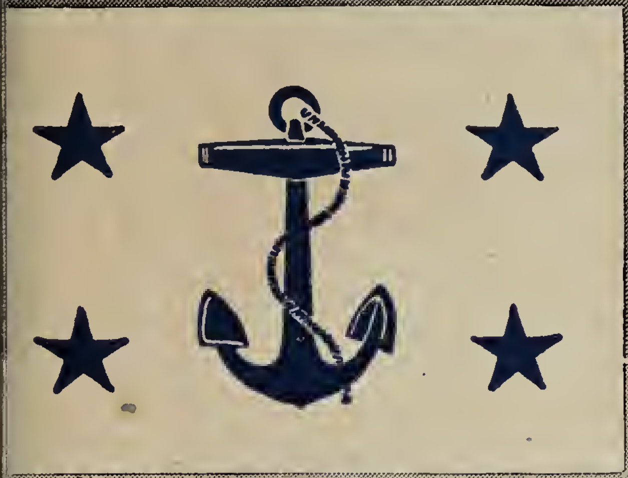

NAVAL MILITIA
COMMISSION PENNANT

ND PENNANTS


COMMISSION PENNANT U. S. NAVY 7 STARS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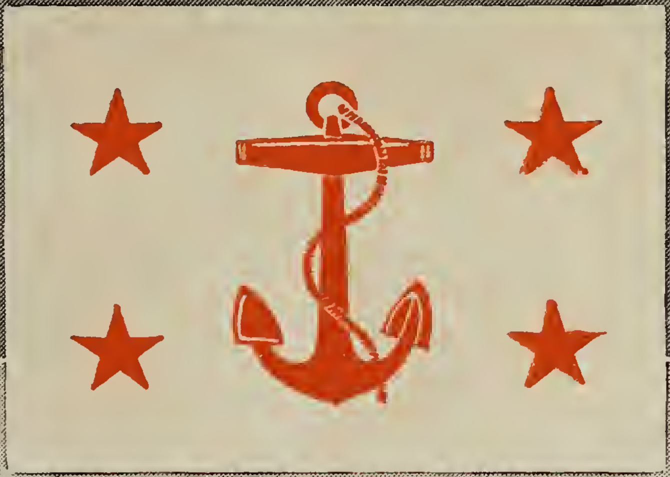
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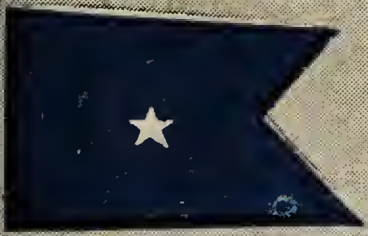
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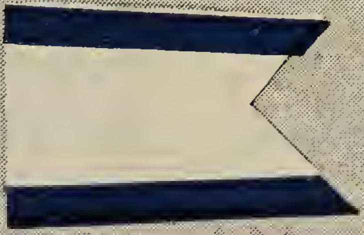
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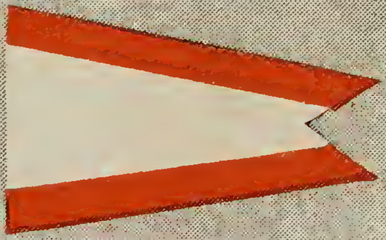
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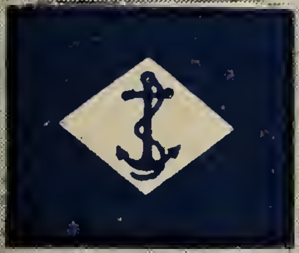
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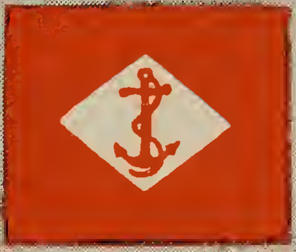
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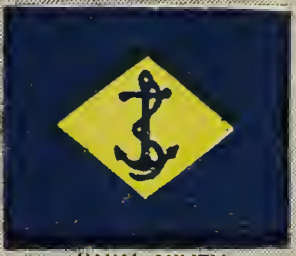
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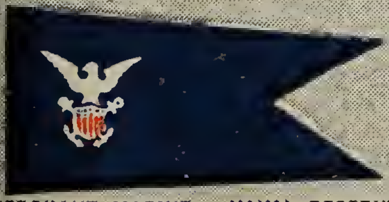
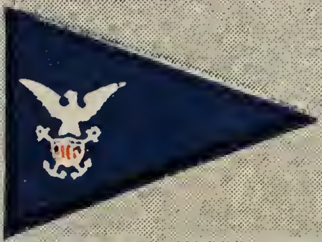

MERCHANT MARINE • NAVAL RESERVE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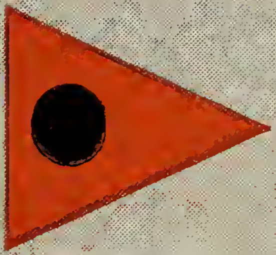
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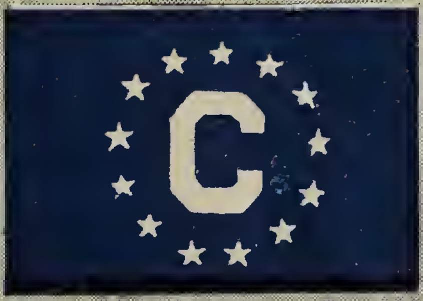
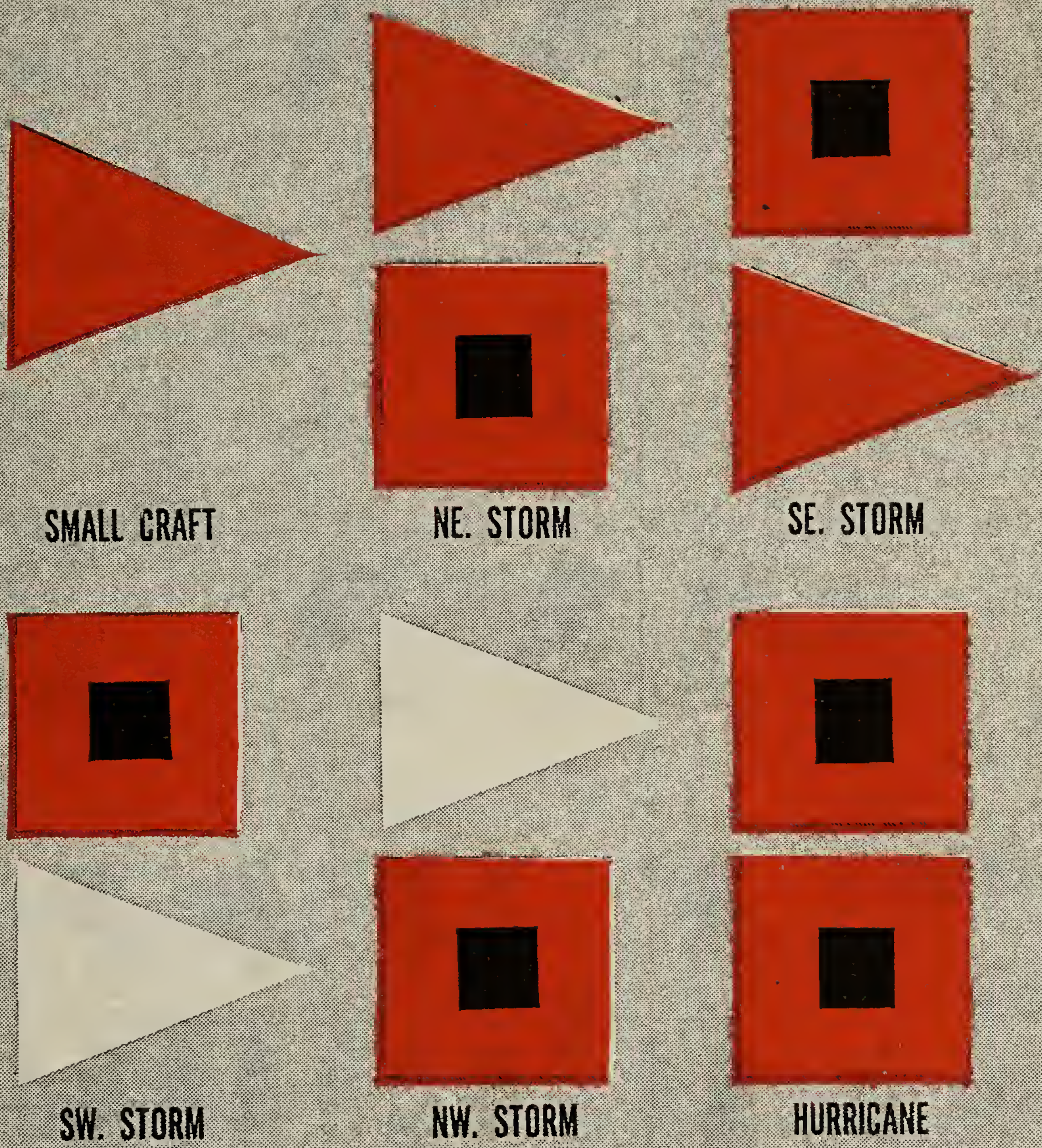
CONSULAR
FLAG



SMALL CRAFT, STORM AND HURRICANE WARNINGS

DAY SIGNALS



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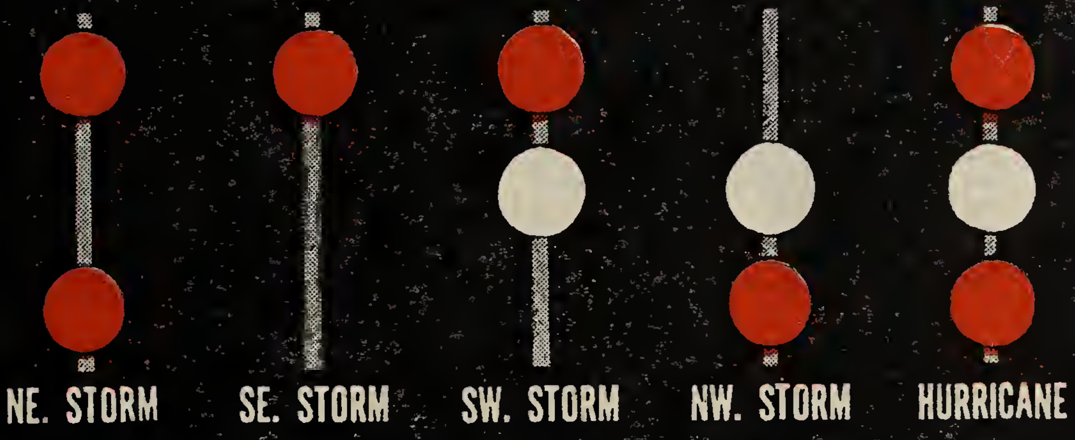
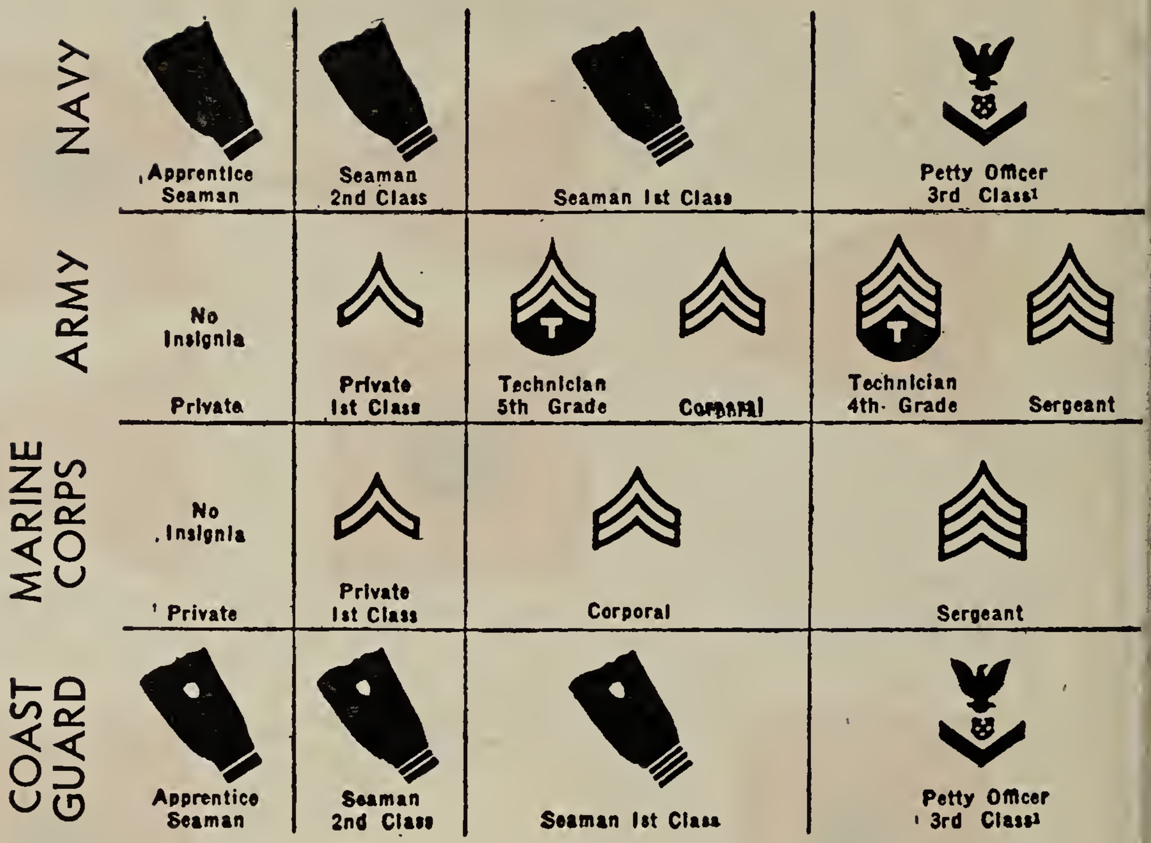
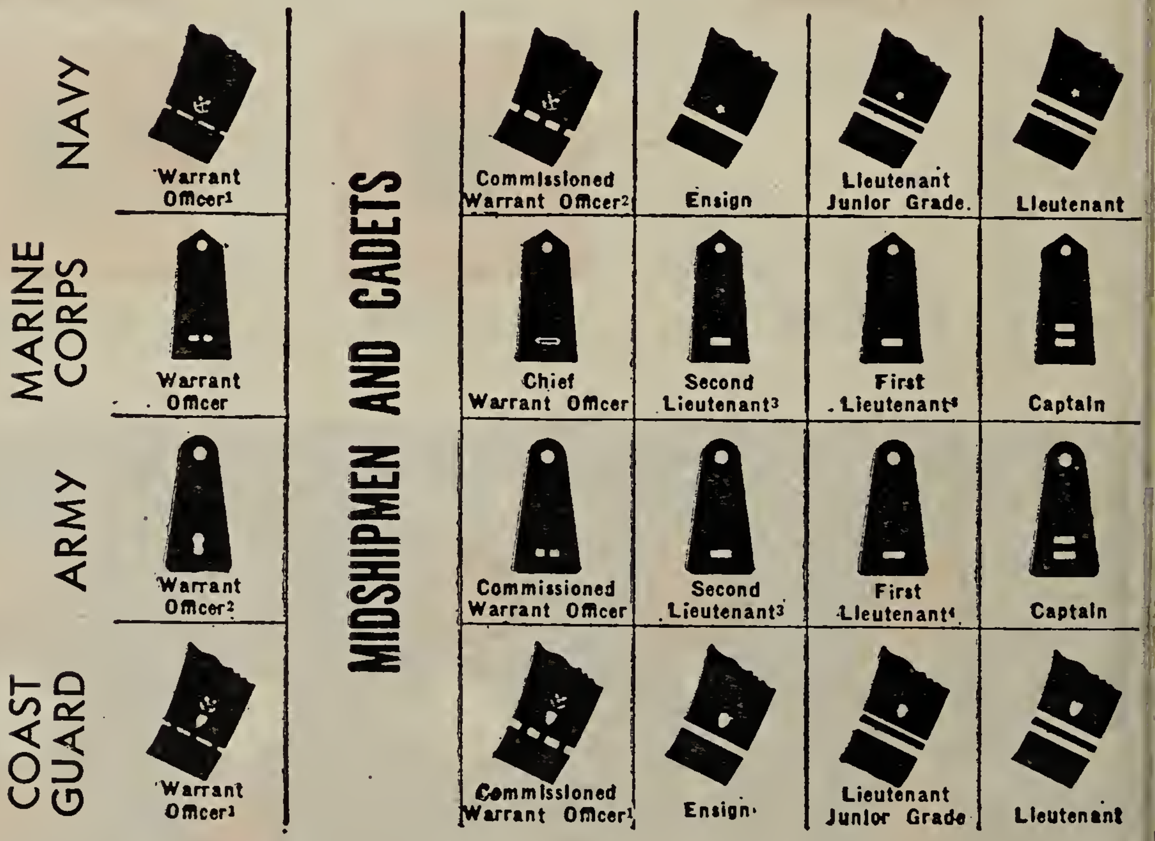


COMPARATIVE RATES AND RANK



NAVY	Apprentice Seaman	Seaman 2nd Class	Seaman 1st Class	Petty Officer 3rd Class[1]
ARMY	No Insignia Private	Private 1st Class	Technician 5th Grade Corporal	Technician 4th Grade Sergeant
MARINE CORPS	No Insignia Private	Private 1st Class	Corporal	Sergeant
COAST GUARD	Apprentice Seaman	Seaman 2nd Class	Seaman 1st Class	Petty Officer 3rd Class[1]



NAVY	Warrant Officer[1]	MIDSHIPMEN AND CADETS	Commissioned Warrant Officer[2]	Ensign	Lieutenant Junior Grade.	Lieutenant
MARINE CORPS	Warrant Officer		Chief Warrant Officer	Second Lieutenant[3]	First Lieutenant[4]	Captain
ARMY	Warrant Officer[2]		Commissioned Warrant Officer	Second Lieutenant[3]	First Lieutenant[4]	Captain
COAST GUARD	Warrant Officer[1]		Commissioned Warrant Officer[1]	Ensign	Lieutenant Junior Grade	Lieutenant

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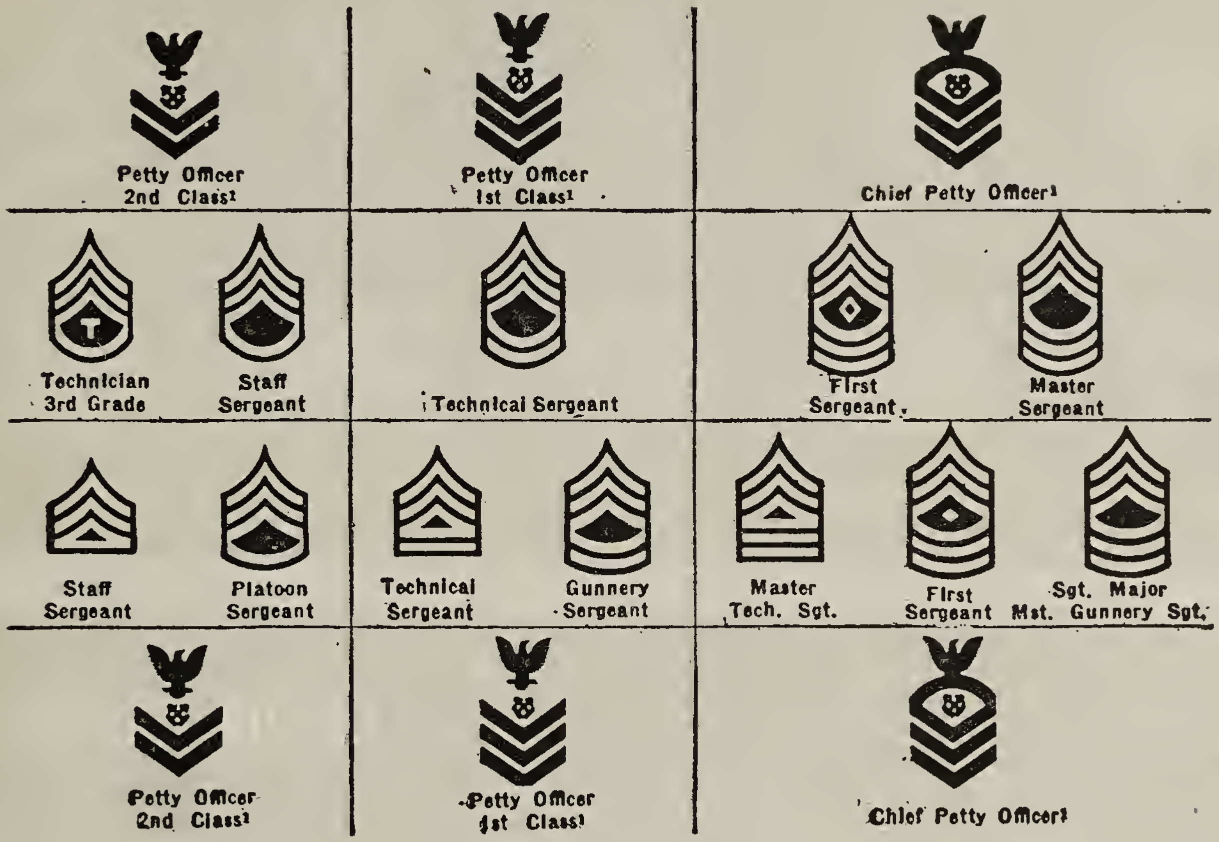
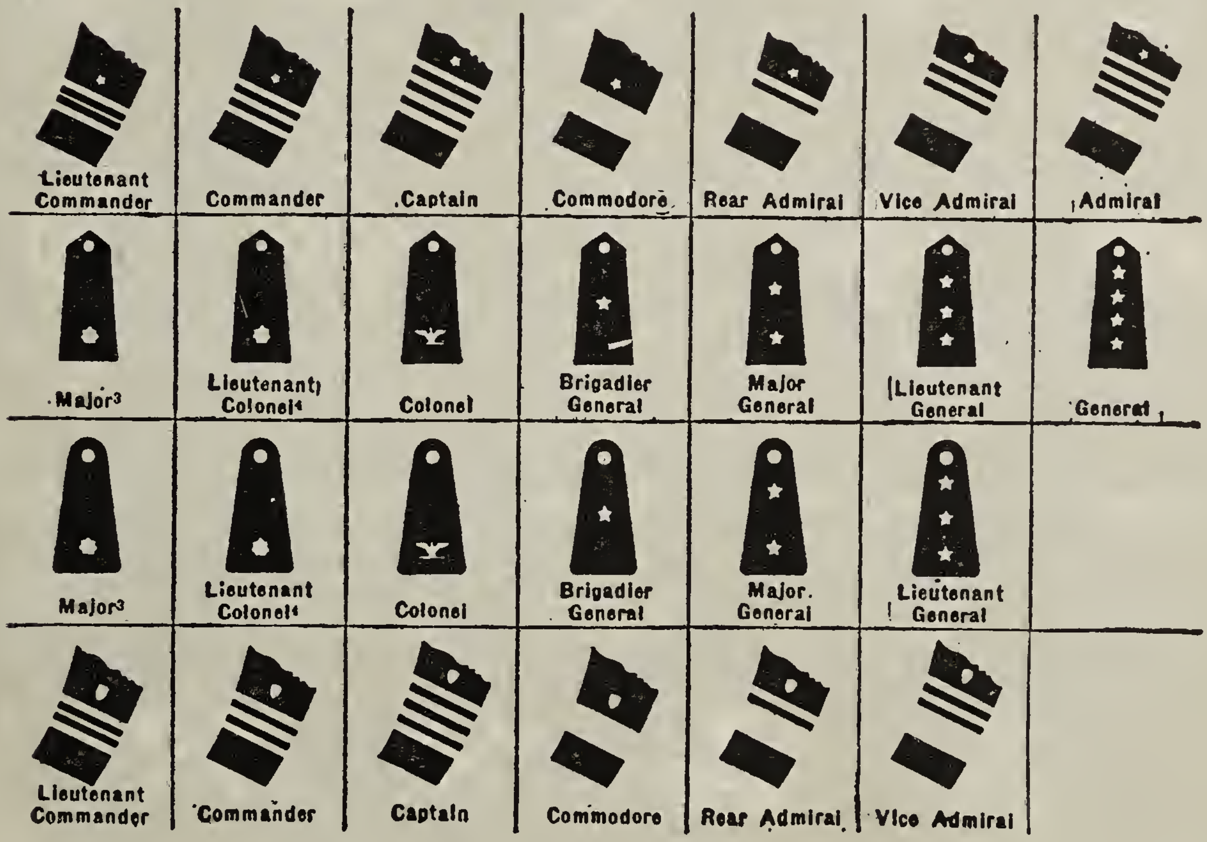
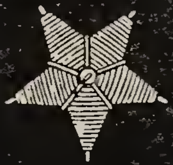
[1] Specialty mark varies with specialty.
[2] Insignia shows specialty. [3] Insignia in gold. [4] Insignia in silver.

OF THE U. S. ARMED FORCES





CORPS DEVICES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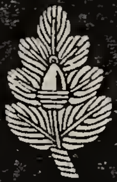
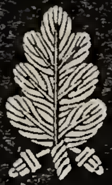

MEDICAL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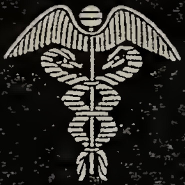
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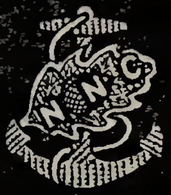

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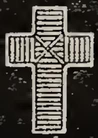
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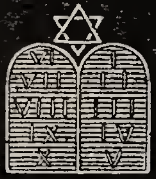
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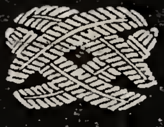
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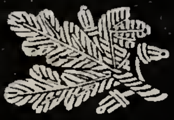
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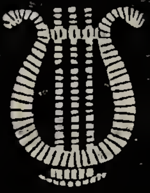
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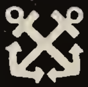
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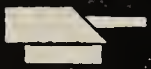
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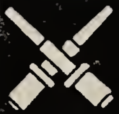
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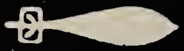
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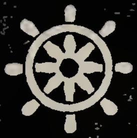
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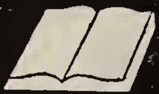
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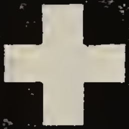
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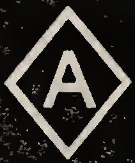

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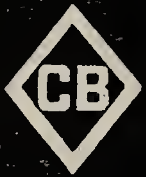

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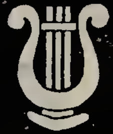
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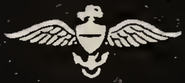
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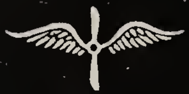
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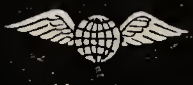
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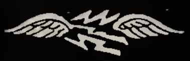
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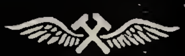
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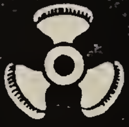
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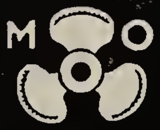

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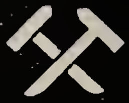
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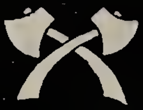
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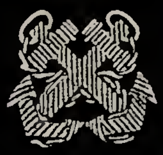
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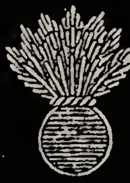
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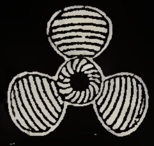
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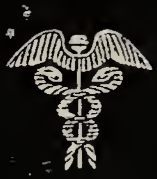
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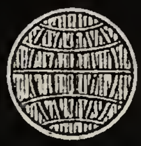
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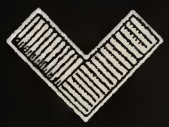
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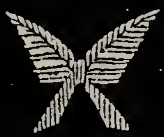
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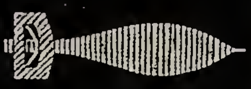
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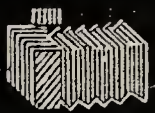
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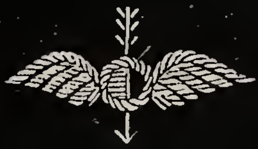
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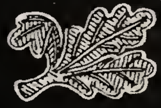
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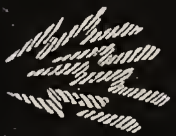
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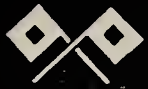
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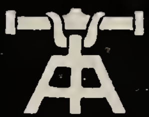
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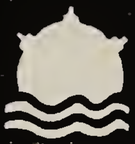
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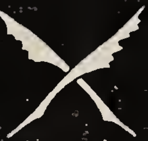
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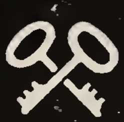
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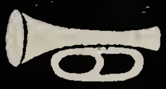
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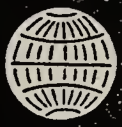
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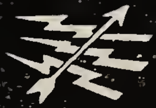
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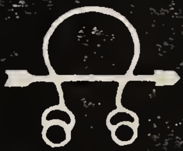
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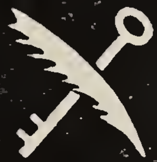
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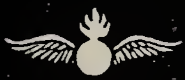
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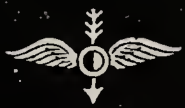
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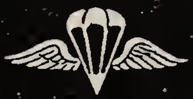
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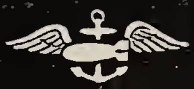
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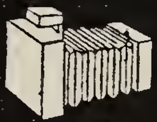
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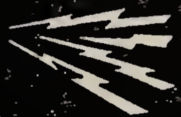
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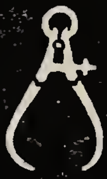
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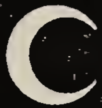
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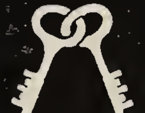
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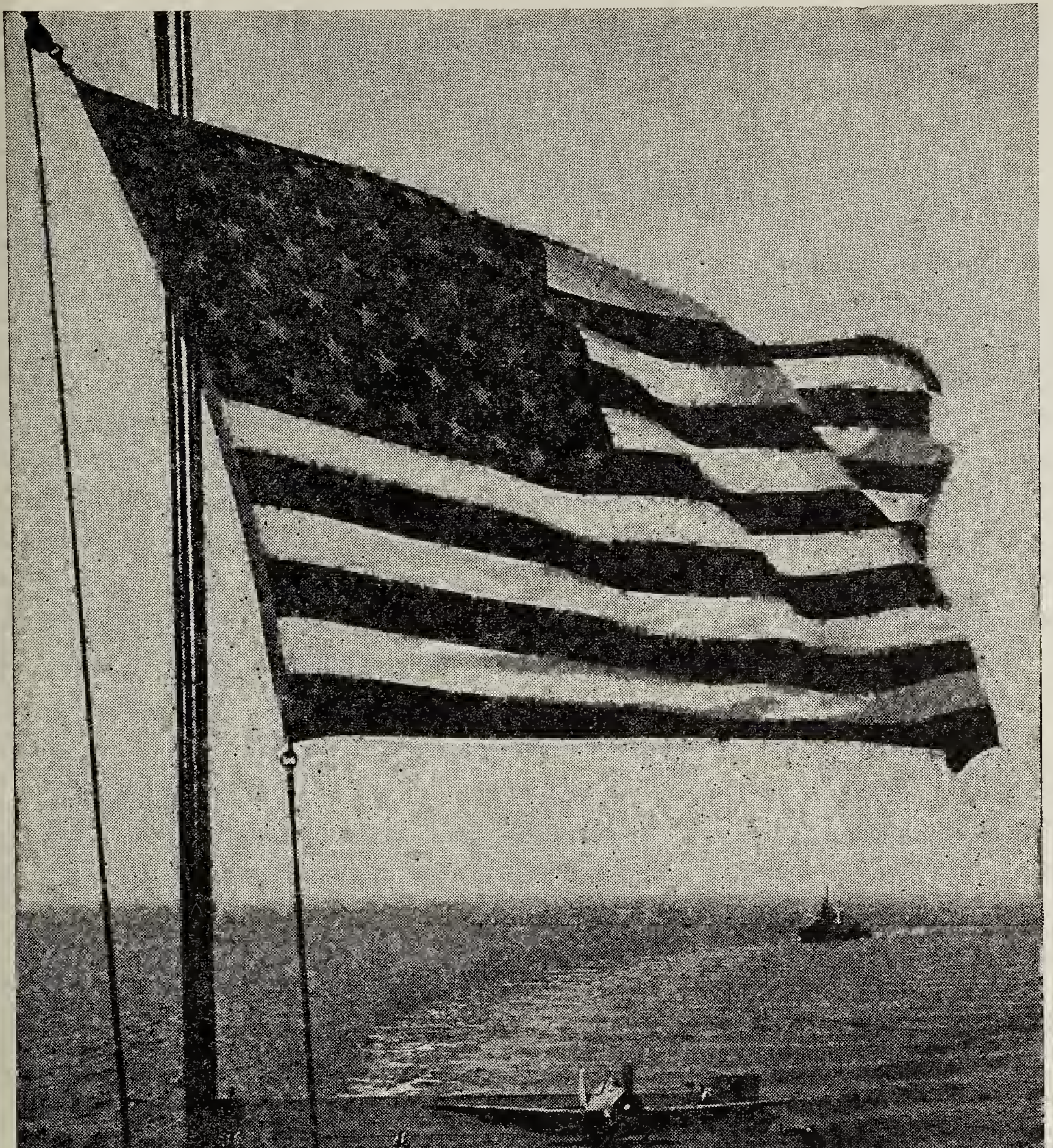


PART 1

INTRODUCTION TO THE NAVY

CHAPTER 1

Entering the Service

You are now a member of the largest and strongest Navy in the world. The change from civilian life to Navy life will probably be confusing for awhile, but soon you will feel at home. In peacetime there were 110,000 men in the Navy; now there are over 2,500,000, and each of these men was once in the same spot where you now find yourself. You cannot know everything about the Navy, or life at sea, regardless of your previous experience. It is a part of your job to learn as much and as quickly as you can while you are at a training station. This manual will help you in your recruit training and will be useful as a reference throughout your Naval career. It tells you what the Navy is, what it does and how it works.

THE NAVY'S JOB

Our Navy is fighting on every ocean in the world in the toughest war of all history. American bluejackets must fight and sweat together to protect our shores and ships from attack, to track down the enemy on the seas and to finish the fight on his own shores. As loyal Americans, each of us must do his share of this tough job and do it to the best of his ability.

THE NATURE OF DUTY

Every Navy man has two jobs: he is a fighting man and a specialist. His fighting duty at his battle station comes first; his daily work and his special jobs are important, too. Each man's job may seem small, but it is part of the fighting efficiency of his ship. Every man's job is small compared to the ship as a whole, but if one man falls down on his job, the ship may be lost.

QUALITIES OF A GOOD NAVY MAN

The Navy has fine schools to train you, and has the best food and medical service available. Nothing will be spared to make you the best trained, best equipped fighting man in the world. Do your part. Learn to work with others. Obey orders promptly, without question.

Be loyal.	Stand up for your ship, officers and crew; show your loyalty.
Obey orders.	Carry out orders willingly, cheerfully and promptly.
Show initiative.	Look ahead; watch for things that need doing. Show that you can be trusted to do the right thing in an emergency.
Be a fighter.	Stay with a hard job. Never say "I can't."
Be reliable.	Do your job thoroughly; don't be satisfied with less than your best.
Keep a clean record.	Uphold the standards of the Navy; this is a big part of Navy teamwork and the first requirement for promotion.
Be fair.	Be square with others and expect the same in return.
Be honest.	Tell the truth, even if it hurts.
Be cheerful.	Keep your chin up when the going is tough. Don't lose your temper over little things.
Be neat.	Be proud of your uniform; keep it in good condition.

THE RECRUIT TRAINING STATION

While the first few days at the training station may be difficult, you will find it easy to make friends and, by consistent work, you will soon learn how to get along.

Receiving unit.—Your first stop on the training station was at the receiving unit, where you were given a thorough medical examination, and issued Navy clothing. The dental officer examined your teeth, and decided on any dental work to be done.

Company organization.—You are in a company of 100 or more men in charge of a petty officer. This officer started his career just as you are starting yours. He will teach you many useful things. Listen to him, follow his advice and do what he tells you. Take your questions and problems to him; he will be glad to help you.

Write home.—Now that you know your definite station, write home often and tell your relatives and friends what you are doing; but be careful not to write about restricted subjects. There is nothing like a letter from home, so encourage your family and friends to write to you often.

Medical service.—You will receive various inoculations to protect you against many diseases. They are important; one man with an infectious disease can easily spread it to many others in his company. Cooperate with the doctors; they want to keep you well, rather than cure you after you are sick.

Military training.—Because military training is new to you, it may seem hard. Remember that thousands of other men have come through it successfully. Follow orders promptly and cheerfully; you will be surprised how quickly you can learn.

The Chaplain.—You have met the Chaplain and he has told you about his job in the Navy. You will find him a friend who wants to help all men in the Navy. The Chaplain works with various welfare agencies such as the Navy Relief Society, the American Red Cross, the Travelers' Aid and the U.S.O. He knows and understands their procedures and regulations, and will be glad to tell you about the work of these organizations. He will also help you if you have a legal problem, or will tell you where you can get the necessary legal advice.

The Chaplain represents religion in the Navy in the broadest sense of the word. He is anxious to see that men of all faiths have the greatest possible opportunity to practice their religion. In a very real sense of the word the Chaplain represents the people back home, and is ready to help you at any hour of the day or night. He should always be called *Chaplain* as his most important duty in the Navy is that of a clergyman.

Questions.—You will probably have questions about such things as recreational facilities, athletics, the use of the library, the safekeeping of money or valuables and how you receive your pay. If any of these things are not made clear to you as you go along in recruit training, feel free to ask your company commander about them.

Selection for further duty.—In the early part of recruit training you will spend several hours taking selection tests which are given you so that the Navy can place you in the right job. Your test scores are part of your permanent service record. Take the tests seriously, pay close attention to directions, and do as well as you can.

Within a few days after you have taken these tests, you will have an interview with a specially trained petty officer. He will ask you about your education, civilian work experience, hobbies, interests and other items. Give him all the information you can; he will enter it on a card, together with your test scores and your physical qualifications.

Classification.—From the information on your card, the interviewer will study all the facts, discuss them with you, and recommend you for a suitable job. Your assignment will depend on the needs of the Navy, and you will be placed where you can help the Navy most.

Officers at the training station. *The line officers.*—The *Commanding Officer* on a station is called the *Captain*, regardless of his rank. In case of his absence or death, he is succeeded by the line officer next in rank. His authority over his own command is supreme. The *Executive Officer* is second in command, under the direction of the *Captain*. He has charge of matters relating to the personnel, routine and discipline of the station. The *Drill Officer*, or *Recruit Training Officer*, is next in line and has general charge of the discipline, care and instruction of men in training. The *First Lieutenant* is responsible for the cleanliness and upkeep of the station.

The staff officers.—*The Medical Officer* takes care of the health of all personnel on the station and is responsible for maintaining sanitary conditions. The *Dental Officer* looks after the dental needs of all hands. The *Supply Officer* has charge of the purchase and issue of all supplies. The *Disbursing Officer* has charge of all official financial transactions. He is in charge of Pay Rolls and disburses pay to Navy personnel. The *Chaplain* has charge of religious interests and the spiritual welfare of the men.

NAVY TIME AND SHIP'S BELL

The Navy day begins at midnight and ends at midnight the next day, covering a 24-hour period. One o'clock in the morning is written 0100 (spoken "oh-one-hundred"). Two o'clock in the morning is written 0200; noon is 1200. One o'clock in the afternoon is 1300, (spoken "thirteen hundred") ; three o'clock in the afternoon is 1500; midnight is 2400. The time is always given as four figures: that is, seven o'clock in the morning is 0700, not 7 or 700. This time system is used both in the Army and Navy.

On board ship, the ship's bell gives the time as shown in the following chart and illustration. Thus a man standing watch can tell the time at every half-hour period without looking at a watch or clock. The ship's bell is sounded in groups of two rings with a pause between, according to the table on page 7. Thus, 1030, or five bells, is sounded ding-ding, ding-ding, ding. The maximum number of bells to be sounded is eight bells, struck on the even hour; at 0400, 0800, 1200, 1600, 2000 and 2400. Each cycle of eight bells corresponds to a watch.

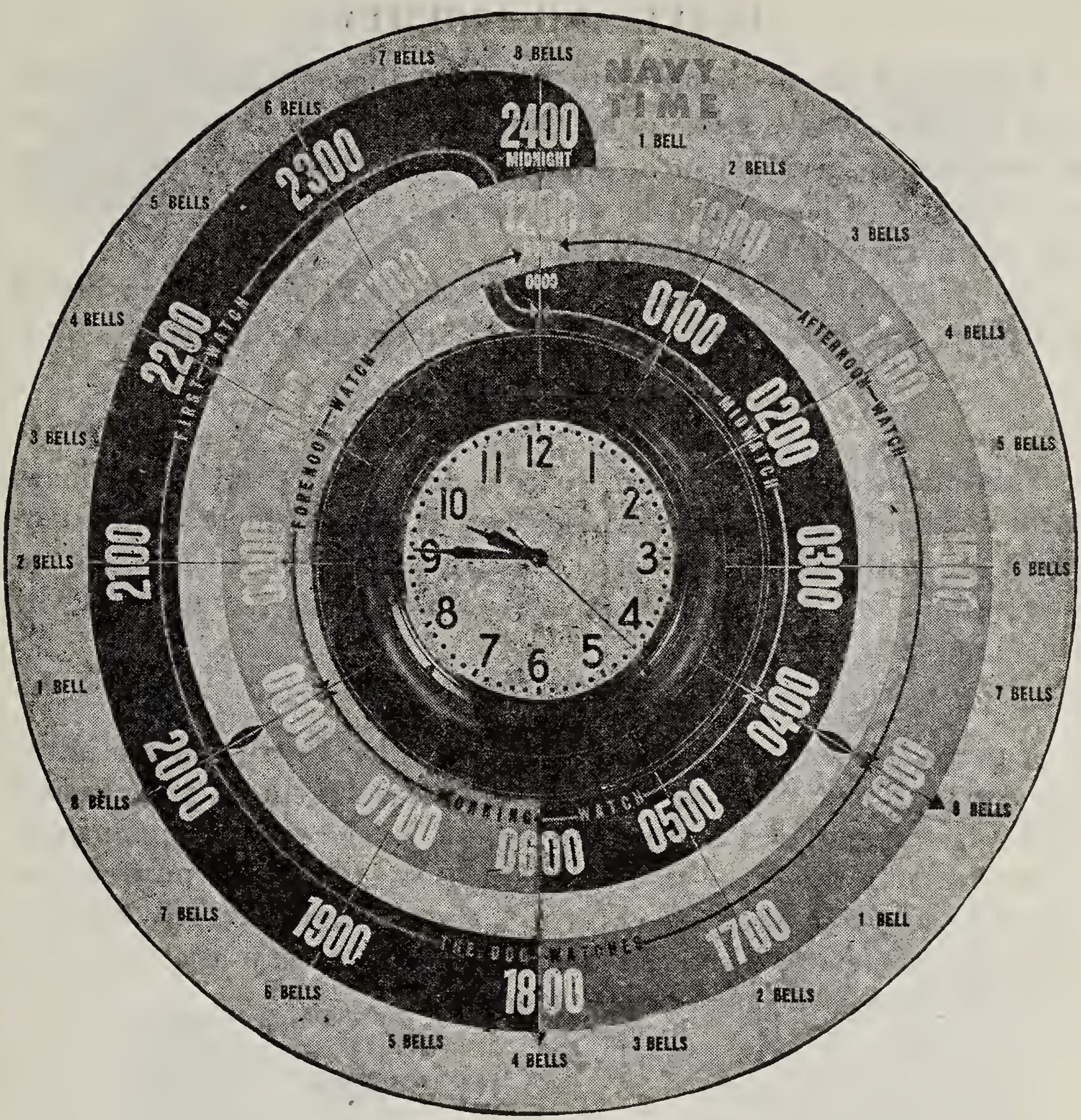


FIGURE 1-1.—Navy Time.

Time						*Bells*	*Intervals*
0030	0430	0830	1230	1630	2030	1	.
0100	0500	0900	1300	1700	2100	2	..
0130	0530	0930	1330	1730	2130	3	.. .
0200	0600	1000	1400	1800	2200	4	.. ..
0230	0630	1030	1430	1830	2230	5	.. .. .
0300	0700	1100	1500	1900	2300	6	.. .. ..
0330	0730	1130	1530	1930	2330	7	.. ..
0400	0800	1200	1600	2000	2400	8	.. ..

LEAVE AND LIBERTY

Authorized absence from duty for more than 48 hours is considered as *leave.* The Commanding Officer is authorized to grant leave to men whose services can be spared. Applications for leave and for an extension of leave must be addressed to the Commanding Officer and not to the Navy Department.

Authorized absence from duty for less than 48 hours is considered as *liberty,* and is also granted by the Commanding Officer.

SICK CALL

This call is sounded once or twice a day. Men requiring ordinary medical attention report to the sick bay at the specified time. Emergency or accident cases will be treated at any time. Concealing a disease and pretending sickness are serious offenses, punishable by court-martial.

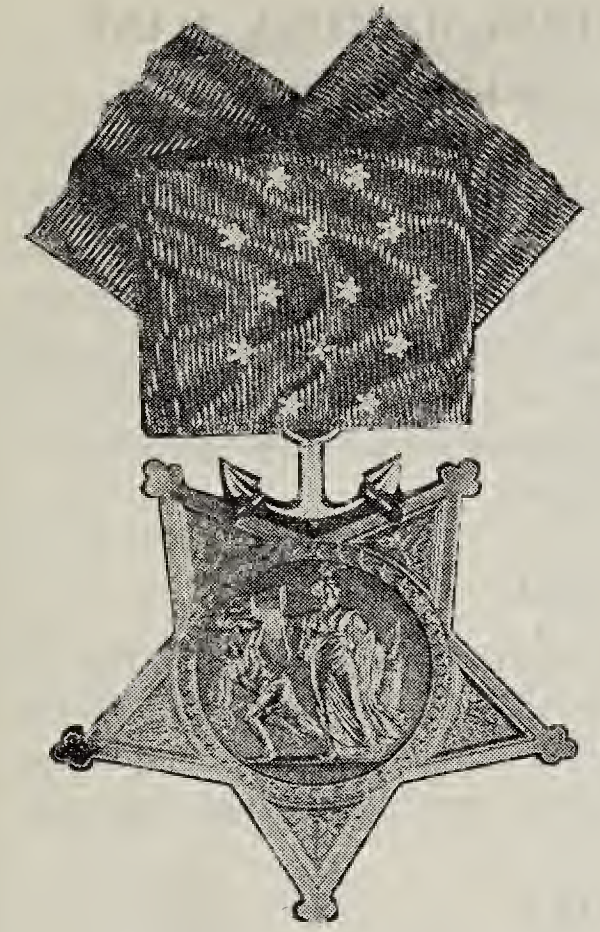
SERVICE RECORD

A personnel record for every member of the Navy is on file in the Bureau of Naval Personnel. This service record shows your record at the training station and service school, your conduct, commendations and punishments—in fact, it includes all official information about you throughout your Naval career. These records are not available to unauthorized personnel, but a man may ask to see his own service record under supervision.

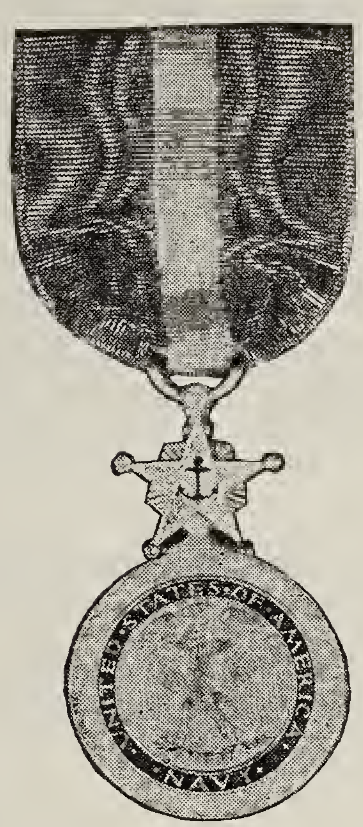
MEDALS AND REWARDS

The *Congressional Medal of Honor* is presented by the President, in the name of Congress, to anyone in the armed services who distinguishes himself by conspicuous heroism in combat with the enemy, at the risk of his life and beyond the call of duty. The *Distinguished Service Medal* is awarded to anyone in the armed services for exceptionally meritorious service to the Government in a duty of great responsibility. The *Navy Cross* is given to anyone in the Naval Service for extraordinary heroism or distinguished service in the line of duty. The *Distinguished Flying Cross* is given for outstanding heroism or extraordinary achievement while in aerial flight. In addition to the above, there are other awards for wounds in action, good conduct, lifesaving, or other meritorious service.

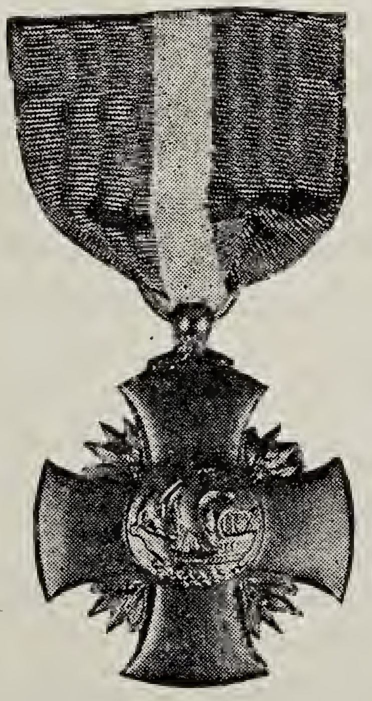
The award of any one of the four medals mentioned above carries with it a pay increase of two dollars a month



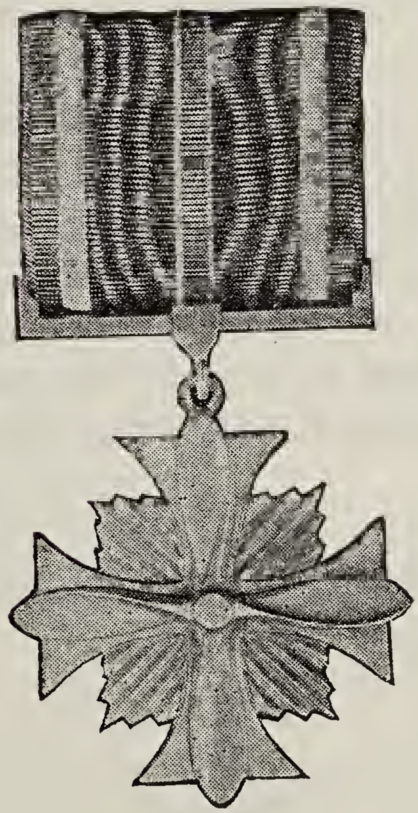
Congressional Medal of Honor (old)



Distinguished Service Medal



Navy Cross



Distinguished Flying Cross

FIGURE 1-2

REQUEST MAST AND COMMENDATORY MAST

A certain time of the day is set aside by the Executive Officer to hear requests from members of the crew. In making a request, bear two things in mind: be sure that your request is reasonable; make your request at the prescribed time. Written requests are addressed to the Commanding Officer who will forward them, with his recommendation, to the appropriate activity. Such requests should be submitted first to your division officer or company commander. A Commendatory Mast is held by the Captain to give awards or commendations to men who have earned them.

LUCKY BAG

All clothes and other effects found adrift at the training station or on board ship are placed in the *lucky bag*. At frequent intervals the lucky bag is opened and the contents distributed to the owners. When men are guilty of carelessness in losing their belongings they are placed on report.

FIELD DAY

Field day is "clean-up day." Field days are held once every week, usually Friday. On these days all hands turn to and the entire training station or ship is cleaned thoroughly.

RETIREMENT AND PENSIONS

Any man who has served for 30 years may make application for retirement. Upon being retired he receives 75 per cent of the base pay in effect at the date of retirement, plus monthly allowances. He is also entitled to medical treatment and hospitalization and is required to keep the Commandant of the district in which he lives informed of any change of address.

DISCHARGES

The classes of discharge in the Navy are as follows:

Class	*Condition*	*Type of Discharge*
A	Expiration of enlistment.	*Honorable, Good or Indifferent*—determined by service record.
B	Medical survey.	*Honorable* for mental or physical disability when not result of own misconduct.

Class	*Condition*	*Type of Discharge*
		Good—same as above, and when marks and record do not meet requirements for honorable discharge. *Good*—when disability is result of own misconduct.
C	Special order of Bureau of Naval Personnel.	*Good* and *Indifferent* for man's own convenience at own request. *Good* and *Indifferent* for under-age enlistment.
D	Inaptitude.	*Good* and *Indifferent*—determined by service record.
E	Undesirability.	*Undesirable* because of unfitness. *Undesirable* because of fraudulent enlistment. *Undesirable* because of desertion without trial. *Undesirable* because of conviction by civil authorities.
F	Sentence of court-martial.	*Dishonorable* and *Bad-Conduct,* depending on the sentence of the court-martial.

An honorable discharge from our Navy is an *honor.* It shows that you have been faithful and obedient and a credit to the Navy, and it will be of great value to you in seeking a position in civilian life. In addition, an honorable discharge opens all the advantages of the Navy to you in case you remain in the service.

CITIZENSHIP

Requirements.—In time of peace, every bluejacket must be an American citizen or a native of an insular possession.

The Nationality Act was amended by the 77th Congress to make special provision for naturalizing aliens of our armed forces in time of war. This amendment provides:

1. No declaration of intention and no period of residence within the United States or any state shall be required;
2. the petition of naturalization may be filed in any court having naturalization jurisdiction regardless of the residence of the petitioner;
3. the petitioner shall not be required to speak the English language, sign his petition in his own handwriting, or meet any educational test;
4. no fee shall be charged or collected for making, filing, or docketing the

petition for naturalization, or for the final hearing thereon, or for the certification of naturalization, if issued:

Provided, however, that (1) there shall be included . . . affidavits of at least two credible witnesses, citizens of the United States, stating that each such witness personally knows the petitioner to be a person of good moral character . . ., (2) the service of the petitioner in the military or naval forces . . . shall be proved by affidavits . . . of at least two citizens of the United States . . . showing that the petitioner is or was during the present war a member serving honorably . . ., and (3) the petition shall be filed not later than one year after the termination of the effective period of those titles of the Second War Powers Act, 1942. . . .

Loss of citizenship.—A man who is convicted of desertion from the Naval service of the United States in time of war loses his citizenship rights.

CHAPTER 2

Naval Discipline

NAVY LAW

The Navy has a set of rules just as the Government has laws. These rules are made by the Secretary of the Navy and approved by the President, in accord with laws passed by Congress. The important thing for you to remember is that these rules are strictly enforced.

The basis for the written law of the Navy is found in the Constitution of the United States, Article I, Section 8, Clause 14, which gives Congress the power "to make rules for the government and regulation of the land and naval forces." The Articles for the Government of the Navy are the first 70 Articles of Navy Regulations. They are always posted on the ship's bulletin board and are read once a month at muster. Read these articles carefully and be familiar with them.

In addition to the written laws, there are many unwritten laws of the Navy which have become widely adopted by custom and usage and by decisions of federal and state courts.

ORDERS AND COMMANDS

One of the first things to know in the Navy is the difference between an order and a command. When an officer gives a man an order to perform a task, he assumes that the man knows how to do it and allows him some choice in carrying out the details of the order. When an officer gives a man a command, the man must do the job in a certain definite way. In general, a command is from a high authority and is used for more important matters than an order. Commands are also used to govern the movement of troops in military drill.

VIOLATIONS OF ORDERS AND REGULATIONS

Deliberate violations of orders and regulations are serious offenses and men found guilty are subject to severe punishment. Discipline requires that you respect the authority placed over you. You have taken an oath to obey authorized orders and commands. The last order given is the one to be carried out. If you are given orders which are confusing, tell the last officer giving you an order and let him decide which you should carry out. Don't try to figure it out for yourself. The decision is his, not yours.

Theft.—In any large group of men there may be a few dishonest ones. The Navy is no exception. To steal an article from a shipmate is a criminal act. The Articles for the Government of the Navy provide punishment for theft consisting of from 2 to 4 years in prison and a dishonorable discharge.

Fighting and disturbances.—To strike another person in the Navy is an offense punishable by court-martial. If you have any cause for argument, take up the matter with your company commander.

It is the duty of the senior line officer present to stop a riot or quarrel and, if necessary, to arrest those quarreling or fighting. All Navy men present are required to render prompt assistance and obedience in helping the officer. Should there be no line officer present, the senior officer of the Navy or of the Marine Corps present shall exercise the same authority and be entitled to the same obedience.

Gambling.—Card playing and other games are usually permitted outside of working hours. Playing cards for stakes and any other forms of gambling are forbidden. Onlookers at gambling are liable to be punished as well as players. This is an offense punishable by the Commanding Officer.

Profanity.—The use of profane or filthy language is forbidden. A man who cannot express his feelings without profanity is seldom a good leader of men. Habitual use of profane language will delay your promotion and may cause you to be placed on report. Your commanding officer is authorized to punish you for this offense.

UNAUTHORIZED ABSENCE

When a man overstays his leave he commits a serious military offense. Always get back before your leave or liberty is over. If this is impossible, notify your station or ship by telegraph or phone, or report to the nearest Naval establishment. Men give many excuses for not getting back on time, but these excuses will not be accepted unless they are supported by adequate proof. Some of the common causes for unauthorized absence are given below.

Overstaying leave through no fault of self.—It is possible that you may be held up by a traffic accident or some other cause beyond your control. Your excuse will probably be accepted if your record is clear and if you have a reputation for truthfulness.

Overstaying leave accidentally.—A good example is oversleeping. But this is a worn-out excuse which is seldom accepted by the Commanding Officer at mast. If you are fully aware of your duties, such accidents are not likely to happen.

Overstaying leave deliberately.—This is a serious offense because it defies the authority placed over you. For example, if you have orders to return at 0800 and you fail to return because you want a longer liberty, or because you have friends with you, you imply that you know you have orders to get back, but decide to stay and take your punishment later.

Intoxication.—Intoxication is often given as an excuse. Some men report that they were intoxicated at the time their leave was up and that they stayed ashore to sober up. The ship or station is the best place for you. If you return and cause no disturbance, your offense will be less serious and your punishment lighter than if you overstay your leave.

Sickness.—Sickness may be an actual reason for overstaying leave. A doctor's certificate doesn't always prove that fact, as men sometimes purchase fake certificates or falsify them. In such a case the man is punished both for overstaying leave and for lying to his commanding officer. If you are too sick to travel, get word to your ship or station immediately, or contact a Naval dispensary, giving your address and condition.

Sickness in the family.—This is not an excuse unless you have reported the facts to your ship. If you do this before your leave has expired it is a point in your favor, since it gives your commanding officer a chance to get in touch with you. Moreover, it shows that you want to obey regulations.

Requests of the family.—These are never excuses for overstaying leave, nor is appearing as a witness before a court. Your punishment is just as serious if you remain away at the request of another person as it would be had you stayed away of your own accord.

Being detained by civil authorities.—This is sometimes a reason for overstaying leave. In this case you should get in touch with your ship *immediately*, giving the facts in the case. The law is that if men are tried and acquitted by civil authorities, they are not to blame for the absence and no punishment is given. If they are found guilty of some misconduct, they will be punished for overstaying leave.

Missing ship.—Missing ship is a punishable offense and means loss of pay during the entire time of absence from the ship. This punishment is given because a man's duty is on the ship to which he is attached. That is where he is needed, and in his absence other men must do his work. If the ship is sailing from the United States, men missing ship are declared deserters. If your ship has sailed, try every means to report on board. If this is impossible, report to the nearest ship or station.

Stretching overtime to the limit.—This is one of the worst mistakes you can make. Men overleave often get the mistaken idea that since they are overleave 2 or 3 days they might as well make it 8 or 9, in the belief that the punishment will be the same. Always return as soon as you can. The sooner you get back the easier your punishment may be. Never remain away because you feel that you will be punished.

DESERTION

Absence from station or duty with the intent to leave the service permanently constitutes desertion. A man is guilty of desertion if at any time he shows the intention of quitting the service permanently before being discharged. Many facts serve to indicate such intent—for example, disposal of uniform, going away and starting a new life as a civilian, or failing to attempt to return.

Nearly all deserters are either captured or surrender. The search for a deserter is never given up and sometimes men are caught years after they think they are safe. Remember, if you desert the chances are that you will be caught and punished.

FRAUDULENT ENLISTMENT

Many men leave the service by desertion or by receiving a bad-conduct discharge due to their own misbehavior. If these men want to get back into the Navy, they must obtain permission from the Navy Department to re-enlist. Any other method will land them in prison. These men are always caught when fingerprints are checked.

NEGLECT OF DUTY

Every man in the Navy has definite duties to perform. Neglect of duty is a serious offense and may be punished in several ways. The nature of the punishment depends on the seriousness of neglect. For example, if you report late for muster you may lose your liberty or be given extra duties. The man who forgets to close a water-tight door or who sleeps on watch commits a serious offense because he puts his ship and shipmates in danger. In this case, the punishment would be more severe, and probably would be set by general court-martial. The object of punishing for neglect of duty is to enforce discipline and to make every Navy man careful, thorough and reliable.

AUTHORITY OF PETTY OFFICERS

Navy regulations state that petty officers shall aid in maintaining good order, discipline and all that concerns the efficiency of the command. They have the authority to report and arrest offenders, both on the ship and while ashore on liberty.

SHORE PATROL

Certain petty officers are designated as Shore Patrol officers to maintain order and good conduct among men on leave or liberty ashore. These petty officers may be assigned temporarily to this duty by the Commanding Officer of a ship or may be trained as rated specialists and attached to a shore establishment.

The petty officers on shore patrol may be recognized by the SP brassard worn on the sleeve which does not have the rating badge. They also wear a pistol belt and leggings and carry a night stick. The shore patrol officer and petty officers have full authority over personnel of the Navy away from the station. Army and Marine M.P.'s (military police) have equal jurisdiction with S.P.'s over Naval personnel. They, too, may order men of the Navy to refrain from unsatisfactory conduct and may order other Navy men to assist them in maintaining order.

In the event of disorderly conduct, the shore patrol or military police may order a man to return immediately to his ship or station even though his leave or liberty has not expired. In more serious instances, the shore patrol or military police may arrest a man, holding him in confinement until they are able to return him to his ship or station.

PUNISHMENTS IN THE NAVY

Punishment by the Commanding Officer.—The Commanding Officer is authorized to assign certain punishments for minor offenses. Cases are tried and punishments given at *Captain's Mast.* The Commanding Officer has the authority to give the following punishments:

1. Reduction of any rating established by himself.
2. Confinement not exceeding 10 days, unless further confinement is necessary in the case of a prisoner to be tried by court-martial.
3. Solitary confinement on bread and water, not exceeding 5 days.
4. Loss of liberty.
5. Solitary confinement not exceeding 7 days.
6. Extra duty.

Deck court.—This court consists of one officer appointed by the Commanding Officer, and is convened by the Commanding Officer when he feels the offense demands a punishment more severe than he is authorized to assign. A deck court can assign the same punishments as a summary court-martial, except that in no case can a deck court adjudge discharge from the service or adjudge confinement or forfeiture of pay for a longer period than 20 days.

Summary court-martial.—This court consists of three officers as members, and one officer as recorder. It is convened by the Commanding Officer for offenses which demand a punishment more severe than can be given by a deck court. A summary court-martial can assign any one of the following punishments:

1. Discharge from the service with a bad-conduct discharge; except that this sentence shall not be carried into effect in a foreign country.
2. Solitary confinement, not exceeding 30 days, on bread and water, or on diminished rations.
3. Solitary confinement not exceeding 30 days.
4. Confinement not exceeding 2 months.
5. Reduction to next inferior rating.
6. Loss of liberty.
7. Extra duty and loss of pay not to exceed 3 months may be added to any of the above punishments.

General court-martial.—This court consists of not more than thirteen nor less than five officers as members, and one officer as judge advocate. It is convened by the President, the Secretary of the Navy, the commander of a fleet or squadron or other authorized officers. A general court-martial can assign any punishment up to and including the death penalty.

REDRESS OF WRONGS

Every man in the Navy is entitled to humane and fair treatment. If a man feels that he is being treated unjustly, he may call this fact to the attention of the Navy in accordance with these regulations:

If any person in the Navy considers himself oppressed by his superior, or observes in him any misconduct, he shall not fail in his respectful bearing toward him, but shall represent such oppression or misconduct to the proper authority. He will be held accountable if his accusations are found to be false.

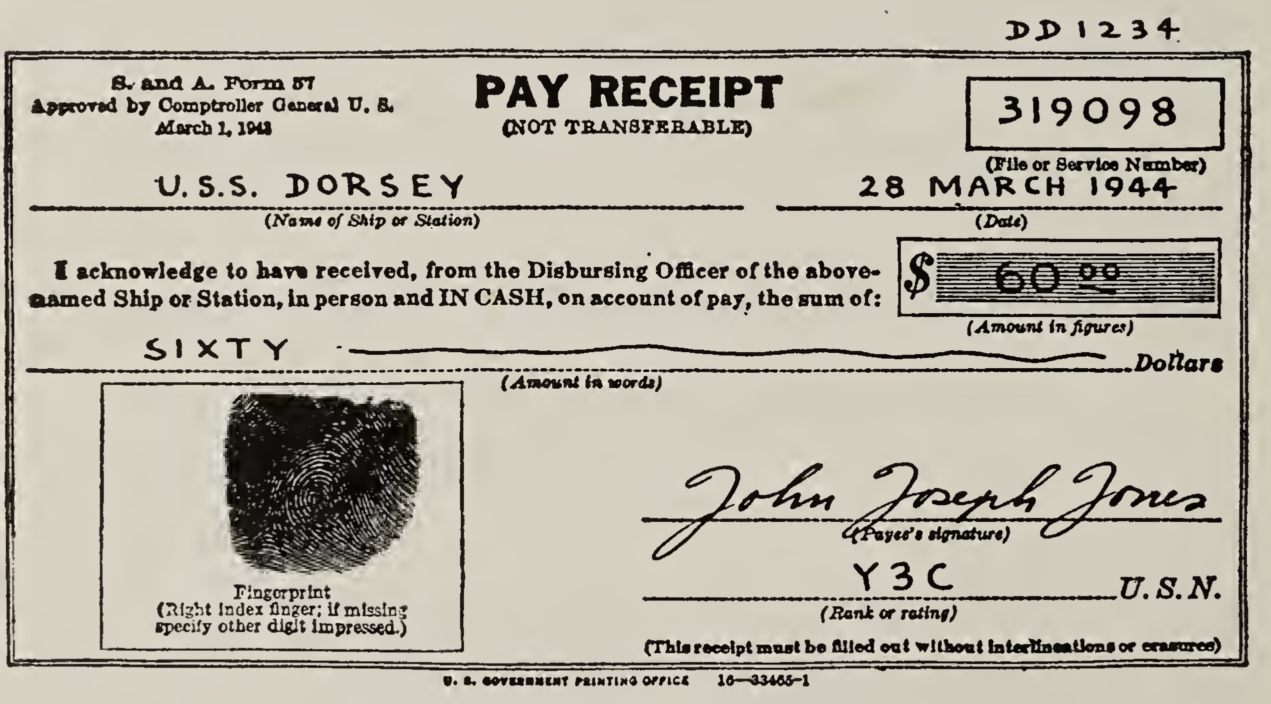
Any application for redress of wrong shall be in writing through the immediate commanding officer to the commander in chief of the fleet or squadron, or to the senior officer present, and it shall be the duty of the latter to take such action in the matter as, in his judgment, justice and good service demand.

CHAPTER 3

Pay Accounts, Allotments, Insurance

ACCOUNTS

Your pay account is kept by an officer of the Supply Corps, who is known as the *Disbursing Officer*. At the time you enter the Navy you will be given a pay number. You should always keep your own record. You know what pay you draw per month and what extra allowances you receive. Keep strict account of all you receive during the quarter. The cash you have due is the remainder of your pay and allowances after your allotments, etc., have been subtracted. You will draw your pay twice monthly.



DD 1234

S. and A. Form 57
Approved by Comptroller General U. S.
March 1, 1943

PAY RECEIPT
(NOT TRANSFERABLE)

319098
(File or Service Number)

U.S.S. DORSEY
(Name of Ship or Station)

28 MARCH 1944
(Date)

I acknowledge to have received, from the Disbursing Officer of the above-named Ship or Station, in person and IN CASH, on account of pay, the sum of:

$ 60.00
(Amount in figures)

SIXTY Dollars
(Amount in words)

Fingerprint
(Right index finger; if missing specify other digit impressed.)

John Joseph Jones
(Payee's signature)

Y3C U.S.N.
(Rank or rating)

(This receipt must be filled out without interlineations or erasures)

U. S. GOVERNMENT PRINTING OFFICE 16—33465-1

FIGURE 3-1.—Cash pay receipt.

LOSS OF PAY DUE TO BREAKING LIBERTY

A man is not paid for the period he is absent over leave or without leave. In addition to this, he is punished for the offense, and this punishment, if by a deck or summary court, usually consists of loss of pay. For a serious case of this offense, a summary court can give a fine of three months' loss of pay.

PURCHASES FROM SMALL STORES

When you draw small stores, the original slip, unless purchase is for cash, is given to the disbursing officer and a copy is given you. The amount of purchase is subtracted from your pay. To protect yourself, you should insist that the cost of each item is shown and the total written at the bottom.

ALLOTMENTS

With the approval of your commanding officer, you are permitted to make an allotment of a part of your pay to a savings account, to insurance, to war bonds or to your dependents. The disbursing officer makes out the allotment and it is paid monthly from the Navy Allotment Office, Cleveland, Ohio.

SAVINGS ACCOUNT

You may deposit money with the disbursing officer in sums not less than $5.00 and not more than your income from Navy sources. You will receive interest on your savings at the rate of 4 per cent per year. This is an excellent way to save money. Deposits may not be withdrawn until you leave the service.

DEPOSITS FOR SAFE KEEPING

On vessels having a disbursing officer attached, deposits for safe keeping may be made with that officer. All such deposits for safe keeping are made at the risk of the depositor.

NATIONAL SERVICE LIFE INSURANCE

This is the cheapest form of term insurance available to men in the Navy and can be obtained in any amount up to $10,000. All men having dependents should be insured, and the insurance must be taken out within 120 days after enlistment. This insurance is a good thing to have, because:

1. It gives cheap and adequate protection for your family during your service in the Navy.
2. In case of death, it is paid in monthly installments so that your family will be taken care of over a long period of time.
3. You may convert your policy after the war to other forms of life insurance and receive credit for premiums paid. If you wish you may convert it after the first year.

WAR BONDS

Putting your money into War Bonds is a good investment. You will save money for yourself and help your country. The following chart shows how large or how small allotments may be, and how they may be applied to the purchase of bonds.

A monthly allotment of	*At the end of so many months*	*Adds up to*	*And buys a bond worth at maturity*
$ 6.25	3	$18.75	$ 25.00
12.50	3	37.50	50.00
18.75	1	18.75	25.00
25.00	3	75.00	100.00
37.50	1	37.50	50.00

AID FOR YOUR FAMILY

Allotments for dependents.—You may make part of your pay available to your dependents by making an allotment of pay.

Family allowances.—The purpose of family allowances is to provide adequate support for the families of men serving their country. Allowances for those wholly dependent upon you for support and for those dependent upon you for substantial support are provided.

Family allowances for Class A dependents are mandatory upon application by the man or by or on behalf of dependents, but for Class B and B-1 dependents are optional with the man.

Part of the allowance, depending on the class, is taken from your pay and an additional amount is paid by the Government.

You should consult with your disbursing officer to be certain that your dependents are receiving the allowance to which they are entitled.

CHAPTER 4

Clothing

YOUR FIRST OUTFIT

The Navy gives you without cost your first complete outfit. All of the clothing you receive from the supply officer is made according to Navy Regulations. It is much cheaper and better material than any you can purchase ashore. Tailor-made clothes are seldom strictly regulation and often will get you into trouble. Your ship's tailor can make alterations at very small expense so that your uniform will fit well. Recruits are not allowed to have civilian clothing on board. Men are not allowed to wear civilian clothing ashore in war time except when taking exercise, or at home when less than three guests are present.

MARKING CLOTHES

You will be given a stencil for marking your clothes. All of them must be marked with your name according to regulations so that none of the markings will show and spoil the looks of your clothes. You will save yourself a lot of trouble if you learn to mark your clothes correctly. Black paint is used on white clothes and dungarees, and white paint on blue clothes. Pen and indelible ink may be used when labels are provided. Every name has to be clear and easily read. The markings are located as follows:

Bathing trunks.—Inside on hem on right center of back.

Blankets.—All corners, 4 inches from each edge, both sides of blanket (total—8 markings).

Cloth cap.—Inside sweat band.

Drawers.—On the outside of the right half waistband.

Gloves.—Initials on small white strip of cloth to be worn on inside of wrist.

Jerseys.—On strip of white cloth sewed inside bottom front edge.

Jumpers, blue.—On a label under the collar at the back of the neck.

Jumpers, white.—On the inside of the hem to the right of the center line of the back; initials only inside back about 3 inches below the seam where collar is attached.

Jumpers, dungaree.—Same as white jumpers.

Leggings.—Inside on center seam, lengthwise.

Mattresses.—In center, 4 inches from each end, both sides of mattress (total—4 markings).

Mattress covers.—Right corners, 4 inches from open end (total—2 markings).

Neckerchief.—Diagonally across center.

Overcoat.—On a label on the inside breast pocket at the center (not inside the pocket).

Pillows.—Same as mattresses.

Pillow covers.—Right corners outside on hem (total—2 markings).

Rubber boots.—On the inside near the top.

Rubber overshoes.—Initials on the inside near the top.

Shirts, chambray.—On the inside, near the bottom hem, to the right of the center line of the back; initials only inside back about 3 inches below the seam where collar is attached.

Shirts, flannel.—Same as chambray shirts.

Shoes.—Inside near the top, or cut initials in side of heels.

Socks.—Initials on legs, across the top.

Towels.—Right corners on hem, parallel to end (total—4 markings).

Trousers, blue.—On a label on the pocket at the right inside waistband.

Trousers, dungaree.—On the waistband on the inside in front, to the right of center line.

Trousers, white.—On the waistband on the inside in front, to the right of the center line, and initials only on the under side of the pocket flap.

Undershirts.—On the outside of the front, 1 inch from the bottom of the shirt and to the right of the center.

Watch cap.—Initials inside on white strip of cloth ½ inch from bottom.

White hat.—On the outside of the brim of the hat when brim is turned down, sufficiently close to the crown so that marking will not show when brim is turned up.

SPECIAL ADVICE ABOUT CLOTHING

Many men get into serious trouble in the handling of clothing due to their lack of knowledge of regulations. Observe the following rules:

1. Never lend your clothes to a shipmate. This may give another man the idea that he can "borrow" your stuff when you are not around.

2. Never borrow clothes from a shipmate. In the first place it is not sanitary and secondly it is contrary to regulations.

3. Never give away or sell clothes. If your name is on the clothes, the man who gets them will have to explain how he got them. If you are not there to give the facts, this man will be charged with "clothing of another man in his possession."

4. See your company commander if you wish to dispose of any clothing. He will tell you how to do it, and get permission from the proper authority for you to do it legally.

REQUISITION FOR CLOTHING

Each ship or station has a schedule of days on which various divisions may draw clothing. On these days you will draw a blank requisition from your division petty officer. Fill it out for the clothing you desire, and turn it in to your division officer for approval. The division officer will then sign the requisition and turn it over to the supply officer. At the hour specified you will go to the small-stores issuing room and draw the clothing as approved on your requisition. The storekeeper who issues this clothing will make out a small-stores slip, in duplicate, showing the price of each item and the total cost of all the clothes drawn. The original will be turned over to the supply officer who will deduct this amount from your pay, and the duplicate will be given to you. Save the duplicate as you may use it to check the amount deducted from your pay.

Men who are in debt to the government due to sentence of court-martial or other causes can draw clothing only on approval of the Commanding Officer and then only on account of necessity for health and comfort.

ACCESSORIES AND RELATED ITEMS

Leggings.—Bluejackets wear leggings with any form of dress when under arms for parade, ceremony, infantry or artillery drill, landing party, guard detail, or when on duty ashore as patrol beachmaster's guard or as a mail orderly.

Side arms.—When the side arms are carried, the belt is worn outside of every coat, including the overcoat. The side arms are worn slightly in front of the right hip. If cartridge attachments are worn with the belt, they are carried in front and to the right and left of the belt buckle. If one cartridge attachment is carried, it is worn to the right of the buckle.

Men wearing side arms shall not remove their hats or caps except in church, or in sick bay.

Pins and jewelry.—No watch chains, fobs, pins or other jewelry may be worn exposed upon the uniform by men in the Navy, except that authorized decorations, medals, ribbons, and the like, may be worn as prescribed.

The hair and beard.—The hair, beard and mustache must be neatly trimmed. The face must be kept clean shaved, except that a mustache or beard and mustache may be worn at discretion. No eccentricities in the manner of wearing the hair, beard or mustache are allowed.

Foul-weather clothing.—Foul-weather clothing, suitable to the climate, will be issued to you at your ultimate duty station.

THE UNIFORM OF THE DAY

Your commanding officer will prescribe the uniform of the day for all hands, and in time of war there will be many variations, to allow for all types of work under all conditions.

LAWS AFFECTING THE UNIFORM

By Acts of Congress and the legislatures of the various states, it is a misdemeanor to discriminate against any person lawfully wearing the uniform of the Army, Navy, Coast Guard or Marine Corps.

It is unlawful for any person to wear the uniform of the Army, Navy, Coast Guard or Marine Corps unless he is a member of these organizations or otherwise entitled to wear it by law.

CARE OF CLOTHING

Every bluejacket at the training station is required to learn the Navy way of caring for clothes. Some of you may be assigned to duty on a large ship where laundry facilities and lockers are available. Even then you will be required to care for your smaller articles of clothing, such as socks and handkerchiefs. If you are given duty on a smaller ship which does not have these facilities, you will be required to care for your entire outfit. Therefore, every recruit has to know the prescribed methods of caring for clothes so that he will be able to do this on any ship or station.

Washing clothes.—Before washing uniforms, be sure that all pockets are empty. Material left in the pockets may stain the uniform.

This is particularly true of whites when tobacco is left in the pockets. Blue uniforms should be scrubbed only very lightly with a brush and should be washed in lukewarm water. Hot water will shrink the material. After washing do not stretch or pull them out of shape while wet.

White uniforms may be scrubbed with a brush in somewhat warmer water than that used for blue uniforms.

Never mix white and blue uniforms in washing, as often the blue dye will discolor white clothes. Socks are particularly bad in this respect since the coloring in them runs easily. Underwear should not be scrubbed with a brush because the fabric may be harmed by heavy brush action. It is a good policy in washing clothes to make suds in a wash bucket rather than trying to lather the clothing by direct application of the soap.

Always rinse clothes thoroughly. If blues are not properly rinsed, the white soap powder will show when they are dry. Whites will turn yellow if not properly rinsed.

Trousers and jumpers should be given a slight hand stretching to remove all wrinkles before they are stopped on the line. For example, the trousers should be turned inside out and held at the waistband by one man while the owner runs his hands up inside the legs. His hands should be straight out and he should withdraw his arms at the same time exerting a slight outward pressure. The jumper should be smoothed in a similar way.

Stopping clothes on line.—Clothing must be stopped on the line for drying in a neat and orderly manner, using the eyelets provided for the purpose. Square knots should be used in tying the clothes stops. All clothes should be two-blocked; that is, tied directly to the line rather than being allowed to hang several inches below. No holidays (vacant spaces) should be left between clothes.

Rolling clothes.—Each item of clothing should be neatly rolled when dry in the following manner:

Trousers, white.—Fold one leg over the other so that seams on the inside of the leg come together and pockets are on the outside. Tuck in the crotch. Turn waistband back to the middle of the leg and turn back the top trouser leg about 6 inches. Roll toward the bottom, keeping the right edges even.

Trousers, blue.—Fold one leg over the other so that seams on the inside of the leg come together and the pockets are on the inside. Do not tuck in the crotch. Turn the waistband back to the middle of the leg and turn back the top trouser leg about 6 inches. Roll toward the bottom, keeping the left edges even.

Drawers.—Same as trousers, except roll from the bottom of the leg upward.

White and blue jumpers.—Place one sleeve directly over the other, the front of the shirt being in the inside of the fold and the collar extending above the neck, with the two side edges together on the inside of the collar. Fold the collar lengthwise of the shirt. Fold the arms back over the collar twice, and roll the jumper back from neck toward the lower edges of the shirt.

Undershirts.—Same as jumpers, except for the directions concerning the collar.

Overcoats.—Lay the overcoat out flat, outside up, sleeves alongside, collar turned down as when worn. Fold back each half of the front over the sleeve nearest it, and then fold one half of the coat over the other half. Fold the upper third of the coat over the center third, and the lower third back over the upper third. Secure the coat with a long stop lengthwise and crosswise, using a square knot.

After clothes are rolled, they should be secured carefully and uniformly by clothes stops. It is suggested that these stops be three fingers from the edge of the clothes or the length of the knife blade from the edge.

Stowing clothes.—You are given a sea bag in which to stow your clothes. There are no locations prescribed for stowing the gear in the sea bag. There are, however, certain common-sense procedures which should be followed.

Out of season clothing should be folded and placed at the bottom of the bag. In stowing a bag, the rolled clothes are placed in layers, each layer being at right angles to the one underneath.

It is important to keep the sea bag clean and therefore it should always be carried when it is moved.

Additional suggestions.—The following suggestions will help you in taking care of your clothing:

1. Carefully fold and put away uniforms after using. Do not carry large or heavy objects in the pockets.

2. Moth holes can be prevented by frequently brushing and airing your clothes. When you stow your clothes for a long time, pack them with camphor balls or cedar wood.

3. To remove oil or grease on blue uniforms, soak a piece of blue cloth in white gasoline, benzine, benzol or acetone and rub the spot briskly.

4. Kerosene can be removed by washing in warm soapy water.

5. Paint stains on blue uniforms can sometimes be removed by washing the garment in warm soapy water. Old and hard paint stains can be removed with turpentine.

6. To remove paraffin and wax, place a hot iron over blotting paper.

7. Iodine stains can be removed with a solution of "hypo," also called "antichlor," followed by a thorough water rinse.

8. To remove chocolate, cover the stain with borax and wash with cold water; then pour boiling water on the stain and rub between the hands. When dry, sponge with a little naphtha, chloroform or benzine.

9. Rust, ink or fruit stains on white uniforms will disappear after soaking in a strong solution of oxalic acid and rubbing with white cotton or linen. Oxalic acid and its soluble salts are poisonous and should be handled with care.

10. A clean cut in serge can be repaired by reweaving threads drawn from another part of the garment. This must be done by a regular tailor and is expensive.

BAG INSPECTION

Bag inspection is held frequently by your company commander to teach you how to keep your clothes clean, tidy, properly marked, and up to the allowance you are required to have. Keep your belongings in condition to pass inspection.

The general procedure for bag inspection is as follows. When the bag inspection call is sounded, go to the bag rack, take your bag, and fall in at the place specified by your company commander. Stand at attention behind your bag. The company commander will then give orders to "Open ranks" and "Lay out bags for inspection." At the latter command take all of your clothes out of the bag, putting all the whites in one pile and all the blues in another. Lay the bag out flat, the bottom toward the company commander or inspecting officer. All bags in each rank must be laid in a straight line. Place all clothes on the bag in a single layer of two rows, blue clothes to the right and white clothes to the left (on board ship blue clothes are placed forward and whites aft) the outer ends of pieces being in the same straight line. The clothing is arranged in the following order, commencing at the bottom of the bag:

1. Blue clothes. Trousers, dress jumper, undress jumper, jersey, overcoat, watch cap, flat hat, leggings and neckerchief.

2. White clothes. Trousers, jumpers, mattress cover, underwear, towels, hats and toilet articles. Socks and shoe gear are placed between the rows of white and blue clothing. The whisk broom is stood on end between the white and blue trousers.

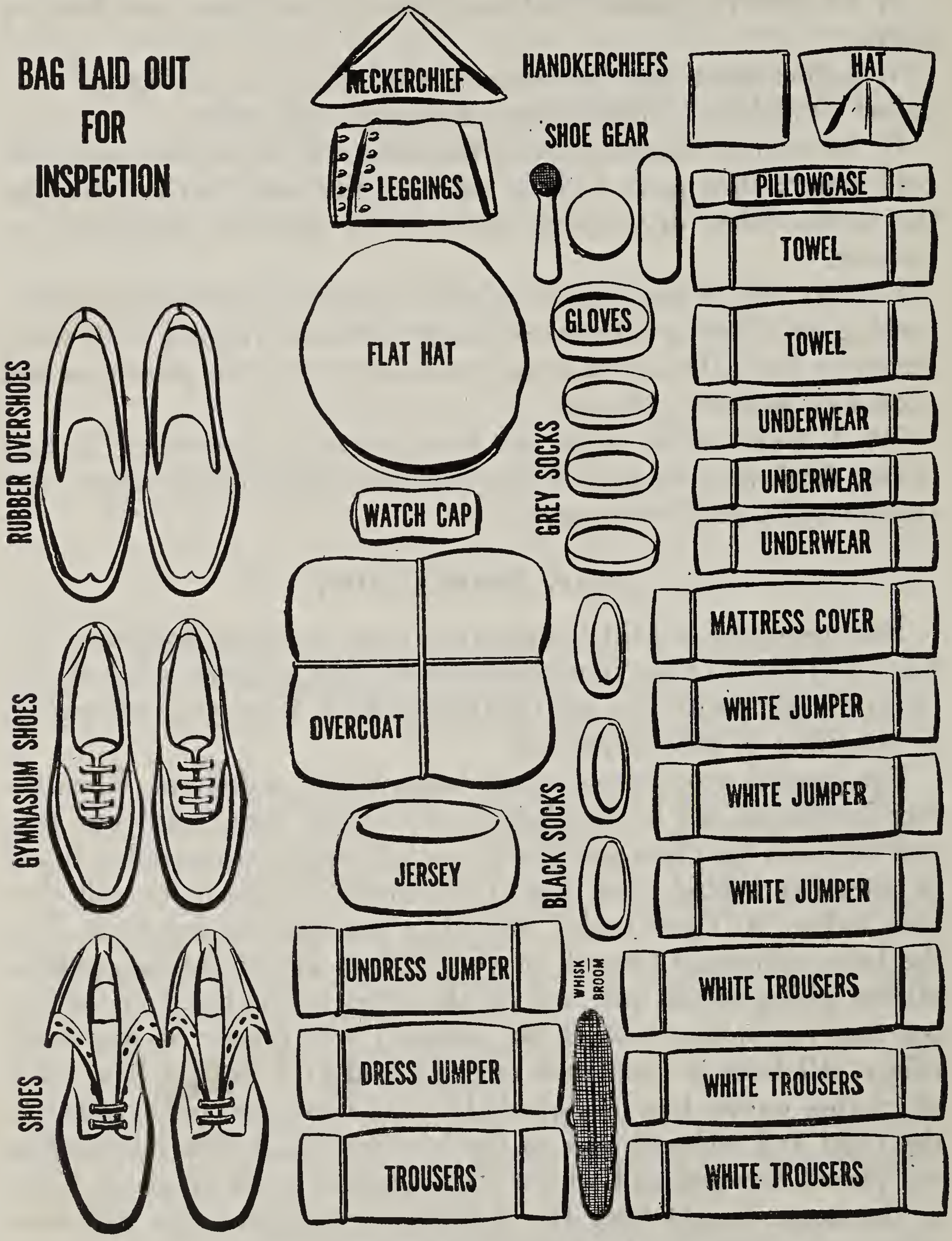


FIGURE 4-1.—Bag ready for inspection.

3. Shoes are placed on the right in the following order: shoes, gymnasium shoes and rubber overshoes. Be certain to have the toes of shoes even with the trousers.

When all bags are laid out each man will stand at attention behind his bag. The company commander will then inspect to see that each man has the required amount of clothing. Those that are short on clothing will draw enough to reach the standard amount. The company commander will then have all men unstop various articles of uniform and hold them up for inspection. He will inspect to see that these articles are of uniform pattern, properly marked and clean. Clothes that are not marked according to regulations must be marked at once. Clothes that are not clean must be scrubbed immediately.

HAMMOCK INSPECTION

Hammocks are inspected after they have been piped down, subsequent to airing, or as ordered. At the command to "Lay out hammocks for inspection," unlash and spread out the hammock, the name on the mattress being turned toward the inspecting officer. Fold the mattress cover and the blankets twice crosswise, placing the mattress cover 10 inches from the head and the blankets 10 inches from the foot of the mattress. Throw the clews over the mattress and coil the lashing in the center. Five minutes after the command to "Lay out hammocks for inspection," the order *ATTENTION* will be given. Men stand at attention at the end of their hammocks until the inspec-

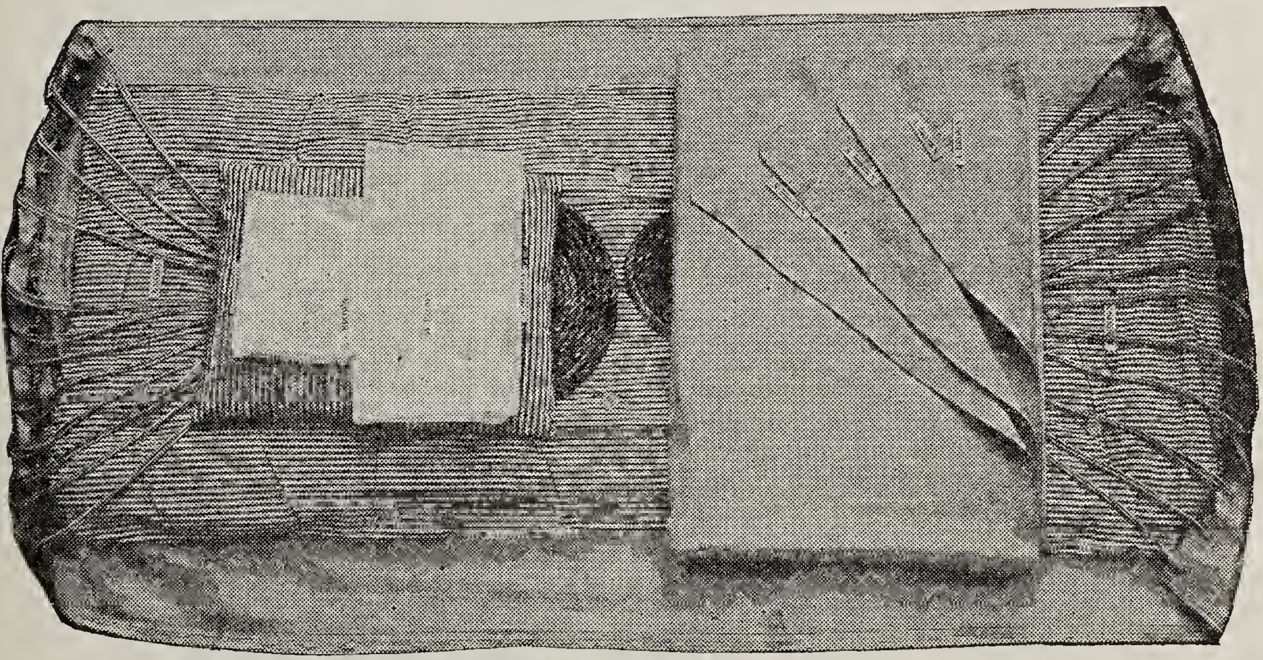


FIGURE 4-2.—Hammock layout for inspection.

tion is over. The inspecting officer inspects all blankets, mattress covers, mattresses and pillows to see that they are properly marked according to regulations and are clean. The illustration shows a hammock laid out for inspection. On vessels equipped with bunks, the bedding is laid out without hammocks. The pillow is placed 10 inches from the head, with pillow cover neatly folded upon it. The mattress cover is placed midway between pillow and blankets.

CHAPTER 5

Personal Hygiene and First Aid

PERSONAL HYGIENE

Every sailor must learn to protect his own health. Water can be thoroughly purified aboard ship, food carefully handled and served, and dishes kept clean. These precautions are useless if the individual sailor throws all care to the winds and eats and drinks anything anywhere without regard to sanitation and common sense. Previous efforts to protect his health go for nothing, and all kinds of diseases and infections may take their toll. The man who refuses to discipline his personal life, eats incessantly, smokes immoderately, over-uses coffee and cuts his sleeping hours to the danger point is asking for trouble. The only satisfactory answer to the health problem is a combination of adequate care by the medical department and a sensible approach to the needs of the human body by the individual.

Preventing infections.—Colds, influenza and pneumonia are passed from one person to another by coughing, sneezing or other means. They are extremely contagious. To prevent spreading of these diseases every man should take great care to sneeze or cough only into a handkerchief and never into the open air. Avoid close contacts with people who have colds. Avoid getting chilled when overheated from hard work or from being in a hot section of the ship. Put on adequate clothing promptly. Don't stand or sit in a draft to cool off. Take a bath or swim and change into dry clothing. If your clothes are wet from rain or spray, keep moving and active until there is a chance to change them. Having wet feet lowers resistance to colds.

Scratches or breaks in the skin afford chances for picking up infections of all kinds. Frequent bathing, at least once a day, in hot water, using plenty of soap, helps to prevent infection. Wearing clean clothes is even more important. Wash or change underclothes at least two or three times a week in hot weather.

Take care of your feet. After bathing, dry carefully between the toes. If there is any evidence of peeling or soreness, apply Navy Foot Powder. If there are breaks in the skin, report to the sick bay and have your feet treated.

To prevent spread of infections by insects, change clothing and bathe frequently. Change mattress covers and air bedding at least once a week. In the tropics mosquitoes are an ever-present source of danger because they spread malaria, yellow fever and other diseases. Wear protective clothes, including headnets and gloves, while on duty at night. Use mosquito killing sprays to keep screened quarters free of mosquitoes and use repellents on exposed parts of your body.

Next to malaria in the tropics, dysentery and other intestinal diseases are to be guarded against. Obey the rules of water and food sanitation. Do not drink water unless it has been boiled, filtered or chlorinated. Wash your hands carefully before eating or handling food. Don't allow flies to get near food.

Venereal diseases.—Venereal diseases are prevalent all over the world. These diseases are serious. From a personal standpoint, they cause irreparable damage to the human body. From the Navy's point of view, they knock out fighting men as efficiently as enemy bullets. Venereal diseases are acquired through illicit sexual intercourse and the only sure means of avoiding them is to practice continence. Sexual intercourse is *not necessary* for the maintenance of health and the fullest degree of physical and mental vigor.

The Navy's measures for the prevention and control of venereal disease are promulgated by general order and ship or station orders and regulations. If, contrary to instruction, advice and warning, you should become exposed to venereal disease through illicit sexual relations, be certain to comply with these orders as regarding prophylactic treatment and reporting the exposure. Compliance with such orders promptly may prevent infection and will save you from disciplinary action. Concealment of a venereal disease is a serious offense because you may, unwittingly, spread your infection to your shipmates.

Eating right.—Eating is probably man's most important means of keeping his body in excellent health. Correct eating habits are essential. The right foods must be selected. If everyone followed a few simple rules about eating, life would be both happier and healthier. The following rules are the most important:

1. Eat what you should and then eat what you wish, but not too much of it.

2. Learn to like all foods. Men travel around the world tasting new foods but often feel insulted if a new dish is offered them at the mess. Many men come to the Navy from fond mothers who let them eat

what they wished. Many of these men choose a bad diet due to the fact that the Navy offers them such a variety of food. Eat some of everything.

3. Do not overeat. Thin, lean, hard-muscled men attend the funerals of the fat ones.

4. Drink plenty of fresh water. Use small amounts of stimulants and soft drinks.

Water should be boiled for ten minutes if you are not sure of its purity. If it cannot be boiled add three or four drops of tincture of iodine to a quart and let stand a half hour. In emergencies, water for drinking can sometimes be obtained by digging a hole just below the high water mark, during low tide. Another source of water in jungles may be found at the base of air plants growing in trees.

Improving posture.—Good posture simply means standing and sitting with the spinal column as straight and free of curves as possible. Erect posture permits all the internal organs to function properly. Slouching posture results in cramping and congestion of the various internal organs. While erect posture is important to everyone, it is particularly important to the bluejacket. A man in military uniform must stand and sit erect in order to have a military bearing. Slouching posture definitely stands in the way of advancement to higher rating.

Aids to erect posture include:

1. At all times keep the chin in and the back of the neck against the collar.

2. When sitting, sit well back in the chair so that the thighs form a right angle or less with the body.

3. When standing, hold the abdomen in and lift the chest, straightening the back, not hollowing it.

Feet and shoes.—In being fitted to shoes make sure that the shoe is at least one-half inch longer than the foot and that the inner border of the toe does not flare out but is straight or inflaring in order that the big toe can always assume a straight or inflaring position. In walking, toe straight ahead, strike on the heel, carry the weight over the outer border of the foot, and finish the step by springing off the big toe. This will give exercise to the muscles of the feet and prevent them from becoming flabby.

When standing, throw the weight to the outer borders of the feet off the arches and raise the arches by flexing and inflaring the big toes. If required to stand long periods at a time, first rest the feet occasionally by rolling way over on the outer edges of the shoes, inverting the soles to face each other, and then exercise the muscles of the feet by alternately flexing and relaxing all the toes. Avoid the use of arch supports as far as possible. Though they may give temporary relief to arch-strain symptoms, they support with mechanical means arches that should be supported with muscles; by their use feet are therefore weakened rather than strengthened.

Wash the feet at least once a day, drying carefully between the toes. Trim the toenails square across the end in order to prevent ingrowing nails. Keep corns and calluses from becoming painfully thick by the use of sandpaper files. Keep the shoes from becoming soggy with perspiration by wearing two or three pairs of shoes alternately and put on a clean pair of socks every morning if possible. When shoes become wet do not dry them so rapidly that they get stiff and shrink. Stuff them with paper or put shoe trees in them and put them where they will dry out slowly. If they become stiff in spite of slow drying, apply oil or grease to soften the leather before attempting to wear them.

All blisters, painful corns and evidence of infection between the toes should be treated promptly at the sick bay.

The care of the mouth and teeth.—Brush your teeth at least twice a day, the bed-time brushing also being accompanied by the use of dental floss. Have two brushes of different shapes to make sure of cleaning all parts of the teeth. Brushing with an up and down motion will not only massage the gums but it will also tend to prevent the undue wearing away of the thin enamel near the gum edges which so often follows habitual brushing with horizontal strokes.

Don't wait for toothache as a signal for going to the dentist. Go promptly when cold or acid foods cause twinges, when tartar scales accumulate beyond the point where they yield to your own efforts, when any fillings come out, or when the gums become sore and bleeding.

FIRST AID

First aid is essentially the same whether in battle or in peacetime, regardless of the cause of the injury. Injuries are liable to occur at any time, on your shore station or aboard ship, as a result of accidents or enemy action. You may be the only uninjured person. Can you help the injured? Can you do the right thing at the right time? This chapter gives you specific instructions which will ease suffering, prevent crippling, and save lives. Learn the principal procedures of first aid. The medical officer can't always be present. Know what to do until he arrives.

Things to be done immediately.—1. If arterial bleeding is present, get it under control at once.

2. If breathing has stopped due to drowning, electrical shock or suffocation, start artificial respiration.

Follow this routine in every case; speed is essential in treating the first two emergencies.

Things to be done later.—1. Examine the injured man's whole body to determine the nature and extent of injuries.

2. If the injuries are minor, let him return to his battle station until "secure" has sounded.

3. If he has severe injuries, keep him lying down, warmly covered. Give morphine for pain. Dress wounds, treat burns, splint fractures as required. Move him carefully to the sick bay or battle dressing station as soon as possible.

Examination of an injured man.—Systematic examination prevents overlooking serious injuries and tells you how to proceed with first aid. Move the injured man no more than necessary and keep him quiet until your examination is finished.

Control of bleeding.—Hemorrhages from war wounds are common. Every man must know how to stop bleeding; even small losses of blood contribute to general poor condition of the wounded and tend to produce shock. Unnecessary bleeding is also detrimental to morale and should be stopped quickly. Bleeding is controlled in the following ways:

Pressure over the wound.—Bleeding from small cuts is stopped by the natural clotting of the blood upon contact with air. A pressure dressing on a wound slows bleeding and allows blood to clot. Try to control bleeding by this method. If a bandage has been put on tightly, *loosen* it every 30 minutes.

Pressure points and tourniquets.—Blood in an artery is under direct pressure from the heart. If the artery is cut or torn the blood is forced out in spurts timed with the heart beat. Arterial bleeding, except in the stomach and chest, can be stopped by applying pressure with the hands at places on the body known as pressure points. Learn these points so that you can apply hand pressure to stop arterial bleeding. After stopping bleeding by hand pressure, it may be necessary to apply a tourniquet. Put it on between the wound and the heart as high as possible on the arm or thigh, over

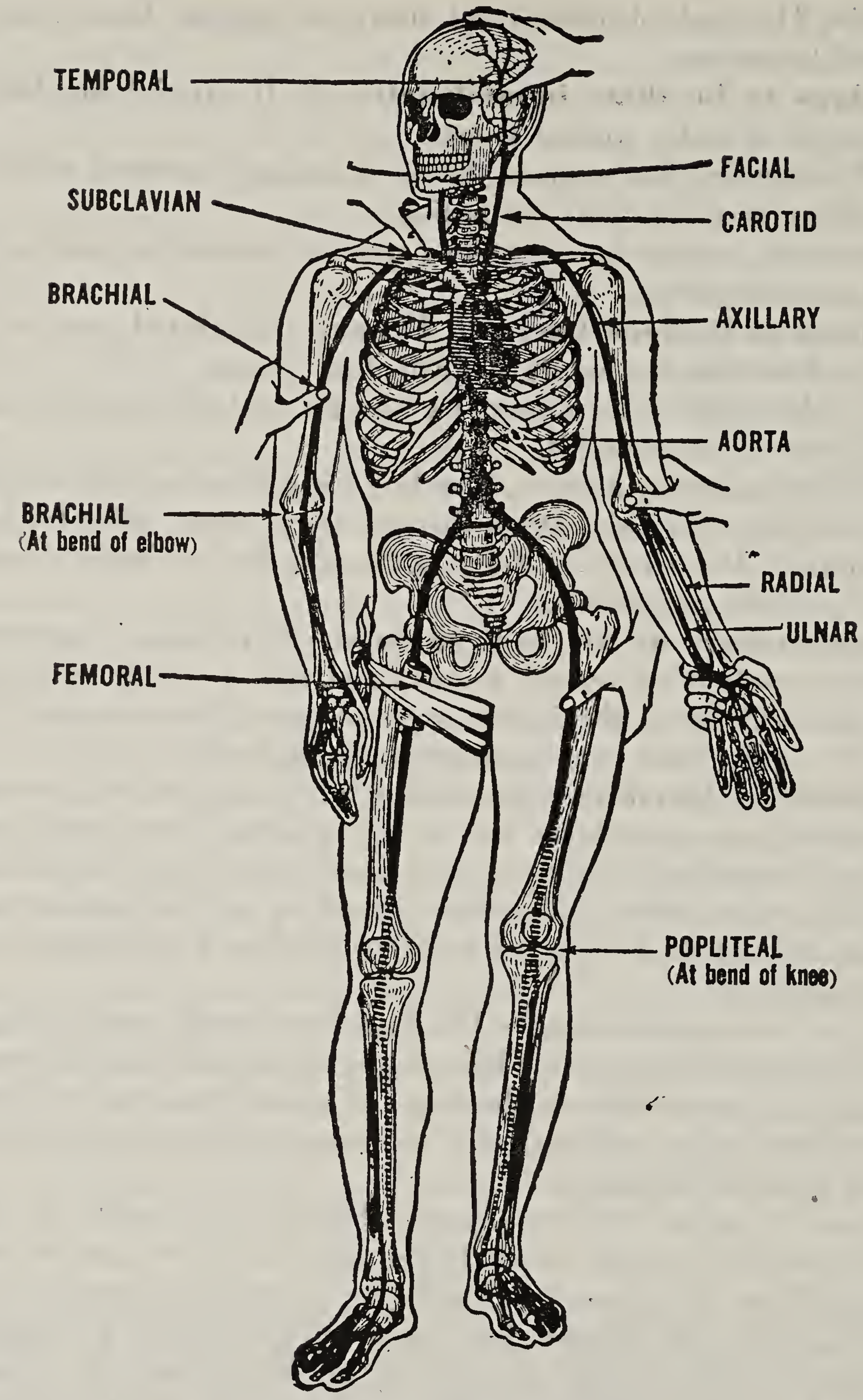


FIGURE 5-1.—Pressure points.

smoothed clothing. When severe hemorrhage is present, whip the tourniquet on quickly and tightly before you decide what to do next. Wounds of the chest or abdomen may cut or tear large arteries or veins causing severe internal hemorrhage. Every casualty of this nature should be examined by the medical officer or corpsman as soon as possible, kept warm, and given enough morphine to induce extreme quiet. In such a case a tourniquet is of no use, but firm sterile dressings will help. In wounds where arterial bleeding can be controlled, a rubber tourniquet may be used. Stretch it and wrap it around the arm or thigh. Secure it by tucking the free end under one of the turns. A rubber tourniquet tends to slip when wet with blood. Be sure it is tight before you leave the patient. A woven tourniquet, neckerchief, or strip of cloth is applied by tying it loosely around the limb and turning it with a knife or stick slowly until bleeding stops. Anything you can tie around the arm or leg can be used as a tourniquet. Put a tag on tourniquet cases. Apply a firm dressing to the wound. Release the tourniquet every half hour, putting it back on if rapid bleeding begins again.

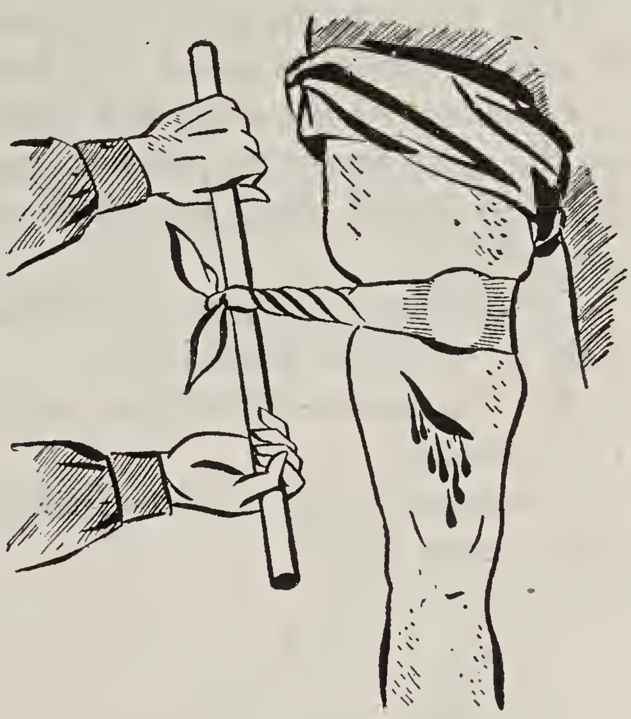


FIGURE 5-2.—Spanish Windlass.

The main pressure points of the body are as follows:

Bleeding from	*Pressure point location*
Arm or hand	Inner side of the arm halfway between the shoulder and elbow.
Thigh, leg, or foot	In the groin at the skin crease.
Shoulder	In the hollow just above the inner end of the collar bone.
Head or neck	Beside the windpipe.
Face wounds	The edge of the jaw bone.
Scalp wounds	Just in front of the ear.

Fractures.—A fracture is a broken bone. Some types are more serious than others, but all need a bandage or splint. Compound fractures require sterile dressings and antiseptics because the bone has injured the surrounding flesh. The following are symptoms and signs of fractures:

Head fractures.—Headache, dizziness, unconsciousness, bruises or cuts on the head, bleeding from the ears, nose or mouth.

Arm and leg fractures.—Deformed appearance, pain or inability to use the limb, localized spot tender to pressure.

Fractures of the neck and back.—Pain in the neck or back, spot on the spine tender to pressure, paralysis of arms or legs. In examining, feel gently along the whole spine from the base of the brain to the pelvis.

Collar bone fractures.—Tenderness to pressure over the bone and pain in using the shoulder.

Rib fractures.—Pain from deep breathing or coughing, tenderness to pressure.

Fractures of the pelvis.—Inability to use legs; pressure about the hips causes pain.

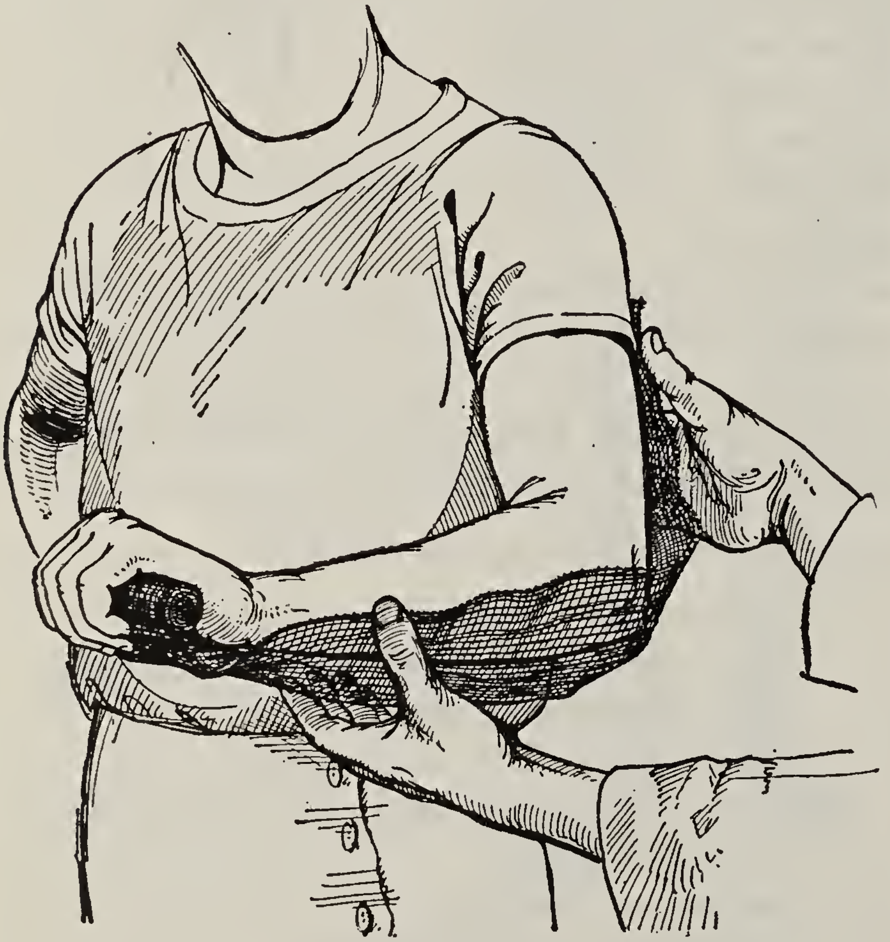


FIGURE 5-3—Applying wire splint to broken arm.

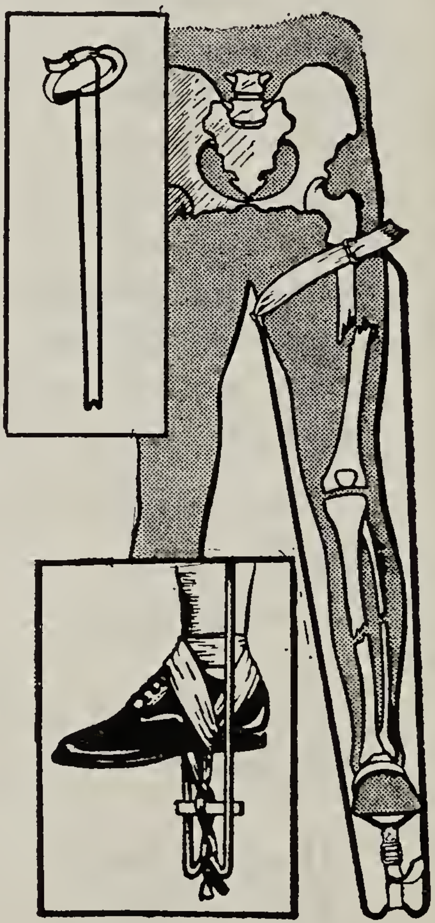


FIGURE 5-4.—Treatment of broken leg.

Treatment of fractures. *Broken arm.*—Splint with the elbow bent. Practice applying wooden and wire splints to the arm. Learn to make and use a sling.

Broken leg or thigh.—The Thomas ring splint or Keller-Blake modification is the best splint. Substitute splints include rifles, pillows, wire mesh and rolled up papers or magazines. The uninjured leg also may be used to splint the fractured leg.

Fractured skull, spine or pelvis.—These fractures cannot be splinted. Do not move the injured man unless absolutely necessary. If it is necessary to move him, get help to lift the patient onto the stretcher. Support the head, back, pelvis and legs, keeping all of them in a straight line during the lift and during transportation to the dressing station.

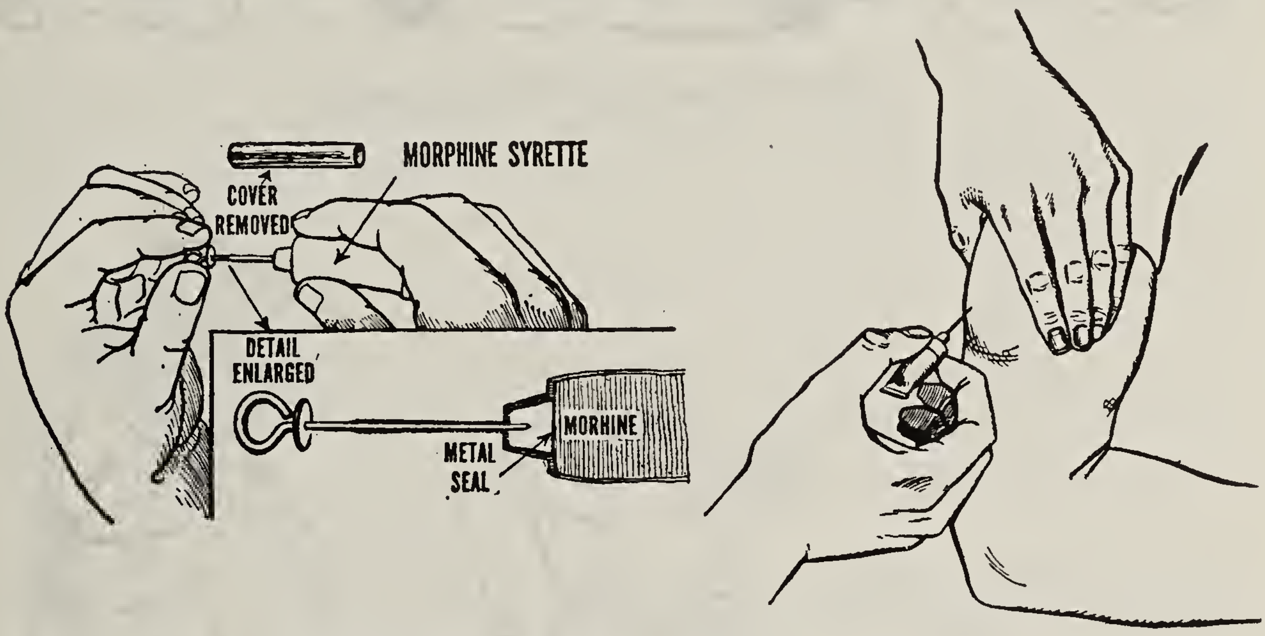


FIGURE 5-5.—Morphine syrette and its use.

Use of morphine.—Morphine is a helpful drug if used properly and at the right time. Use it to stop pain and prevent shock and in case of severe injuries or burns. Do not give it to a man with minor injuries or to an unconscious man. Follow this procedure in giving a morphine syrette:

1. Paint iodine on uninjured skin areas. If no antiseptic is available, wipe the skin dry and inject the morphine. The best area for the injection is the outer side of the arm or the thigh.
2. Take the tube of the syrette at its shoulder with your finger tips. Remove the shield, hold the wire by the loop, push it through the needle to break the seal, and then discard the wire.
3. Insert the needle through the skin into the flesh beneath.

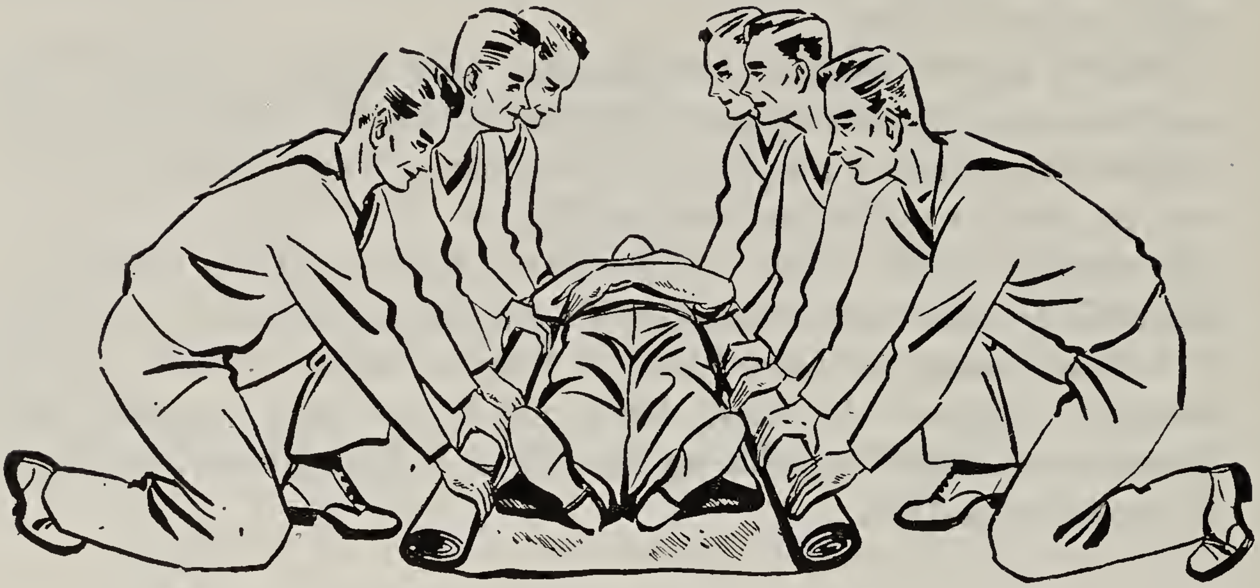


FIGURE 5-6.—Blanket lift and carry.

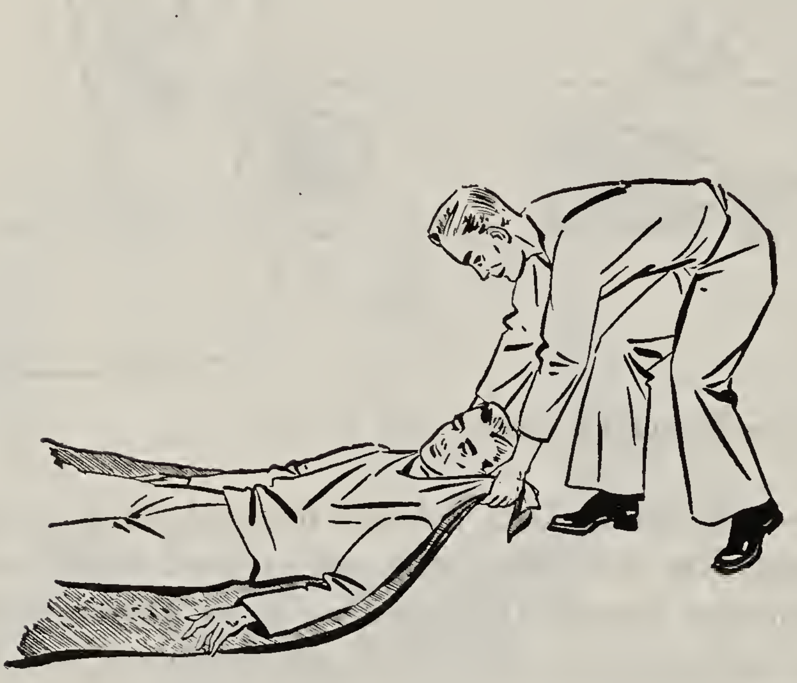


FIGURE 5-7.—Collar-blanket drag.

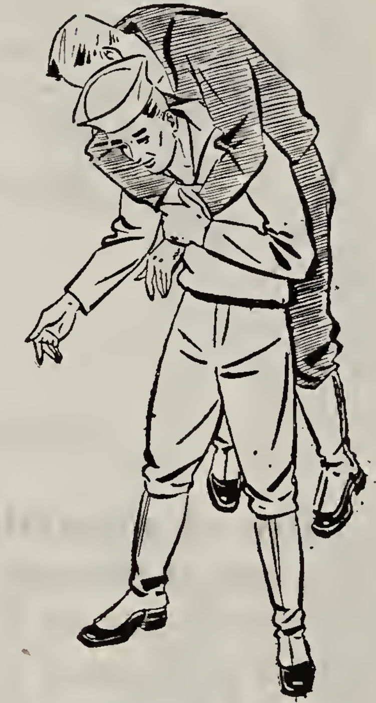


FIGURE 5-8.—One man lift and carry.

MOVING AN INJURED MAN

4. Squeeze out the contents of the syrette.
5. Withdraw the needle and throw it away.
6. Tag the man to show that morphine has been given.
7. If the first dose does not ease the pain within an hour give a second dose and tag a second time. One dose will last about three or four hours.

Dressing of wounds and burns.—First aid dressings are applied to control bleeding and prevent infection. Most wounds and burns will respond satisfactorily when covered with a secure sterile dressing and treated within a short time by the medical officer. If there is the possibility of delay in medical care, use sulpha powder or other available antiseptic.

If no medical aid is readily available sprinkle the contents of a package of sulpha powder into each wound. Do not use more than two packets on one person even if he has many wounds. Do not use anything else in or around the wound. Apply a sterile dressing over the wound, bandage it snugly if bleeding is to be stopped. Use sulpha tablets by mouth as directed on the package. The most serious types of wounds are head, chest and stomach. The procedure for dressing the wound varies with the location. If the wound is on a limb, wrap a bandage securely about the limb and tie it snugly or tightly if bleeding is to be stopped. If the wound is on a broader surface, apply the bandage directly over the wound and secure with adhesive tape as provided in the first aid kit.

If medical care is available apply sterile dressing to wounds using no antiseptic. Give morphine if necessary. Notify the medical department as soon as possible.

Moving an injured man.—There are four methods for moving an injured man. Remember to move him only if necessary and then *gently* and *carefully*.

1. Stokes wire stretcher or Army litter.
2. The blanket lift and carry.
3. The collar-blanket drag.
4. One man lift and carry. Note: use only when absolutely necessary.

Gas casualties.—For directions on first aid and decontamination in the matter of gas attack see Chapter 31.

Artificial respiration.—Directions for artificial respiration will be found in the following chapter.

CHAPTER 6

Physical Fitness, Swimming and Lifesaving

NAVY PHYSICAL FITNESS PROGRAM

Navy ships are designed to deliver terrific blows against the enemy; yet many of their advantages are lost if their crews fail in the hour of battle. Navy men must be agile, strong, and must have great endurance.

The physical fitness program will prepare you to meet the most difficult and challenging physical duties. In addition, this program prepares you for any eventuality at sea—even the sinking of your ship, when it might be necessary for you to stay in the water for long periods of time. There may be occasions when only top physical condition will enable you to meet the emergency.

Because many men are in poor condition when they enter the Navy, the physical fitness program starts slowly in the first week of training. As you gradually get in better condition, your training becomes more intense and demanding. With regular and vigorous exercise, rest and good food, your condition will rapidly grow better during the period of recruit training.

It is one thing to get into condition and another thing to keep in shape. There are emergencies during war that make it necessary for you to take personal responsibility for keeping in good shape. Every man should have from 20 minutes to an hour of vigorous exercise daily. Remember that the man in good condition feels better, looks better, is stronger, and is better able to carry out his duties than a man in indifferent shape.

Physical fitness tests.—During the first week of training all recruits are given the Navy physical fitness test. At the end of training the same test is given to measure improvement. The score is based on the number of squat-thrusts, sit-ups, push-ups, squat-jumps and pull-ups the recruit can perform. The physical fitness program will enable you to improve your score.

By getting into good shape and keeping in good shape, you serve the Navy to your best ability and help protect yourself against many of the dangers of life aboard a combat ship.

SWIMMING

For details concerning swimming activities in the Navy refer to Chapter V of the "Physical Fitness Manual for the U. S. Navy." In it are described in detail the Navy standard swimming tests, the classification of swimmers, and complete instructions for developing the fundamental swimming skills. Swimming is more than an exercise to the Navy man; almost every day some sailors somewhere have to swim for their lives. The following sections cover matters of importance to every sailor regardless of his ability or interest in swimming as a means of physical exercise.

Cramps.—Violent movement in the water, long swimming, or continuous swimming in cold water may cause muscular cramps. These are most likely to occur in the arch of the foot or in the calf of the leg. Their greatest danger is that they will frighten you. Take a deep breath, bend yourself forward in the jellyfish float position, and slowly but firmly knead the cramped muscle. The only way to be sure that you can cure cramps is to practice this method of treating them both with and without clothes.

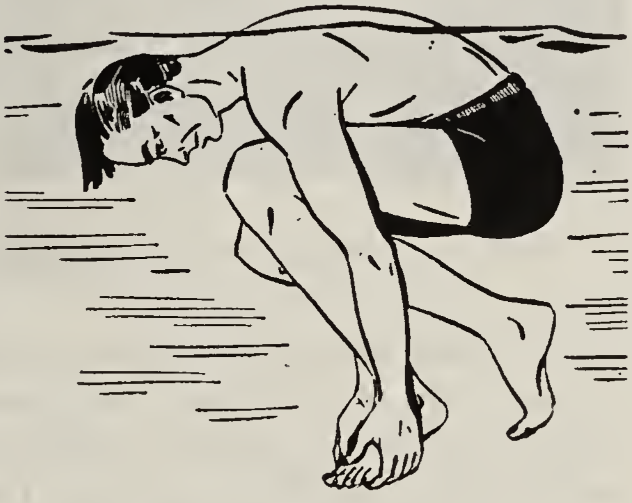


FIGURE 6-1.—Massaging cramped foot muscles.

Grass or seaweed.—You may find yourself in water in which progress is hard because of grass or seaweed. In these conditions use the crawl stroke. The recovery of the arms over the water gives more chance to shake loose. If you get tangled up, loosen yourself by gentle waving and shaking movements of the arm or leg entangled.

Removal of clothes.—If it is necessary to remove clothes while in the water, take off the heaviest articles first. By using the position described for the treatment of cramps, untie and take off your shoes. To remove trousers, assume a back float position. Unbutton them and slide them down over your hips. Then flutter-kick out of them.

Keeping afloat.—Many different things will support you in the water. Planks, spars, boxes, crates or shell cases can be used. If no other means of support is at hand, your clothing will keep you afloat.

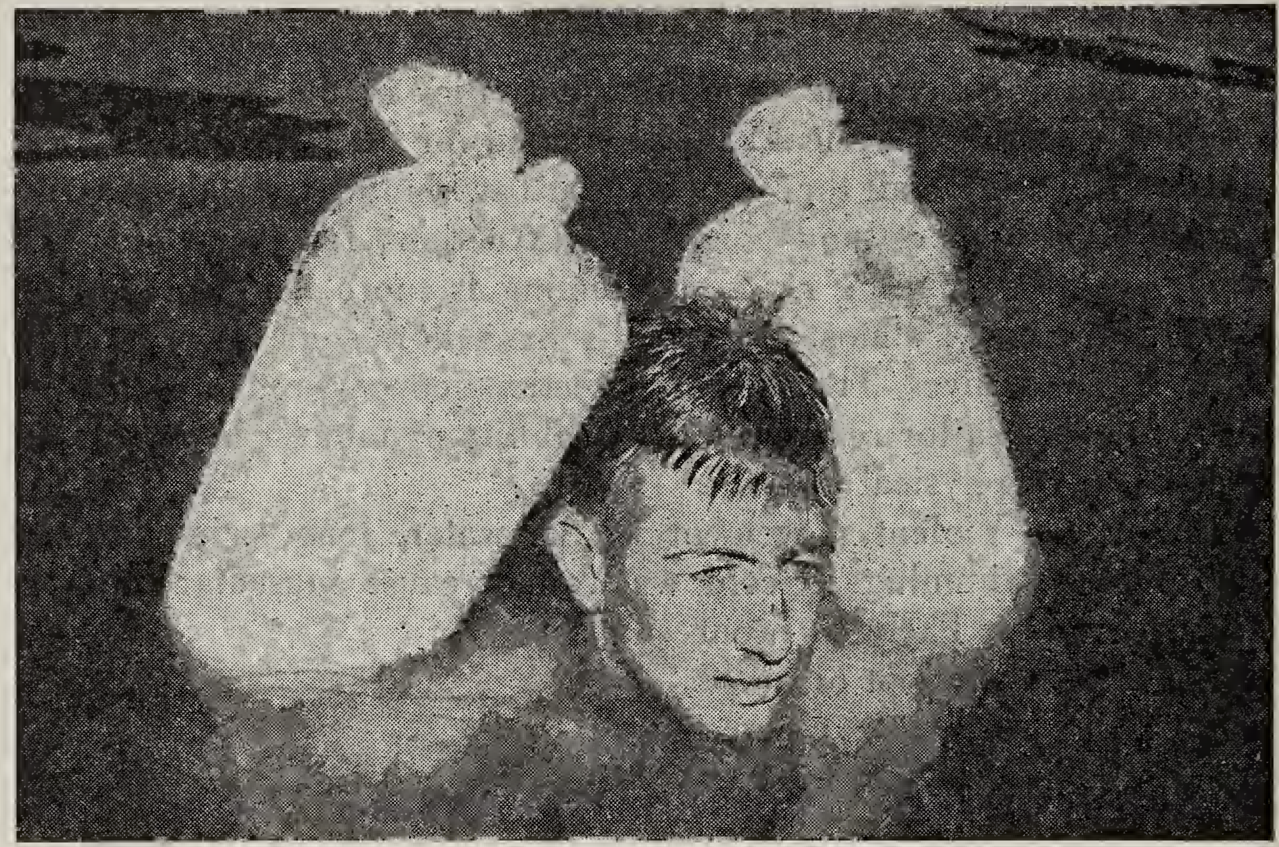


FIGURE 6-2.—Using inflated trousers as a float.

Inflate your jumper or shirt by tying the cuffs and collar and blowing air into the opening, then hold it under water. Trousers make better buoys than jumpers. After they are removed, float them on the surface with the fly turned up. Tie a single knot in each leg. Grasp one side of the waist of the trousers with each hand and work them around on the surface until they are at the back of the head and neck. Flip the trousers over the head and bring the waist smartly down on the surface, trapping a good pocket of air in each leg. Gather the waist under the water and hold it with one hand. Mattress covers, sea bags, laundry bags, pillow cases and sacks may also be used for support by capping the openings on the surface.

Swimming in rough water.—Rough water will knock you around a good deal. Do not fight it. The principal job is to keep from choking while attempting to breathe. Swim slowly and inhale through the mouth with the head well above water. Exhale through the nose with the head under water. The side and breast stroke are better for use in rough water than the crawl and backstroke.

Swimming in burning oil.—It is not possible to swim through burning oil, flames or debris, but you can swim under them. If you have to jump into oil or flames, do so to windward, feet first, holding your nose and covering your mouth with one hand and your eyes with the other. Take a deep breath before jumping. Do not wear a kapok jacket or an inflated lifebelt when you have to jump and swim under water. Wear clothing, however, as a protection against flames or debris, but take off your shoes as they will slow you down.

Swim under water as long as you can. When you have to take a breath come to the surface with your arms above your head. When your hands break the surface begin beating away the burning oil with a circular thrashing motion. When the upper part of your body emerges from the water turn with your back to the wind, continuing to beat away the burning oil, take a deep breath, and submerge, using a feet-foremost drive. Then swim under water, as before, to windward.

LIFESAVING

Successful lifesaving in the water depends upon the presence of mind of the rescuer, a knowledge of the methods which may have to be used, and strength and skill in carrying out these methods. Remember that a drowning person is usually far advanced in the stages of panic. His one idea is to keep his head above water so that he can breathe. The whole technique of lifesaving is built upon this fact. Nine times out of ten a drowning person will try to grab hold of some

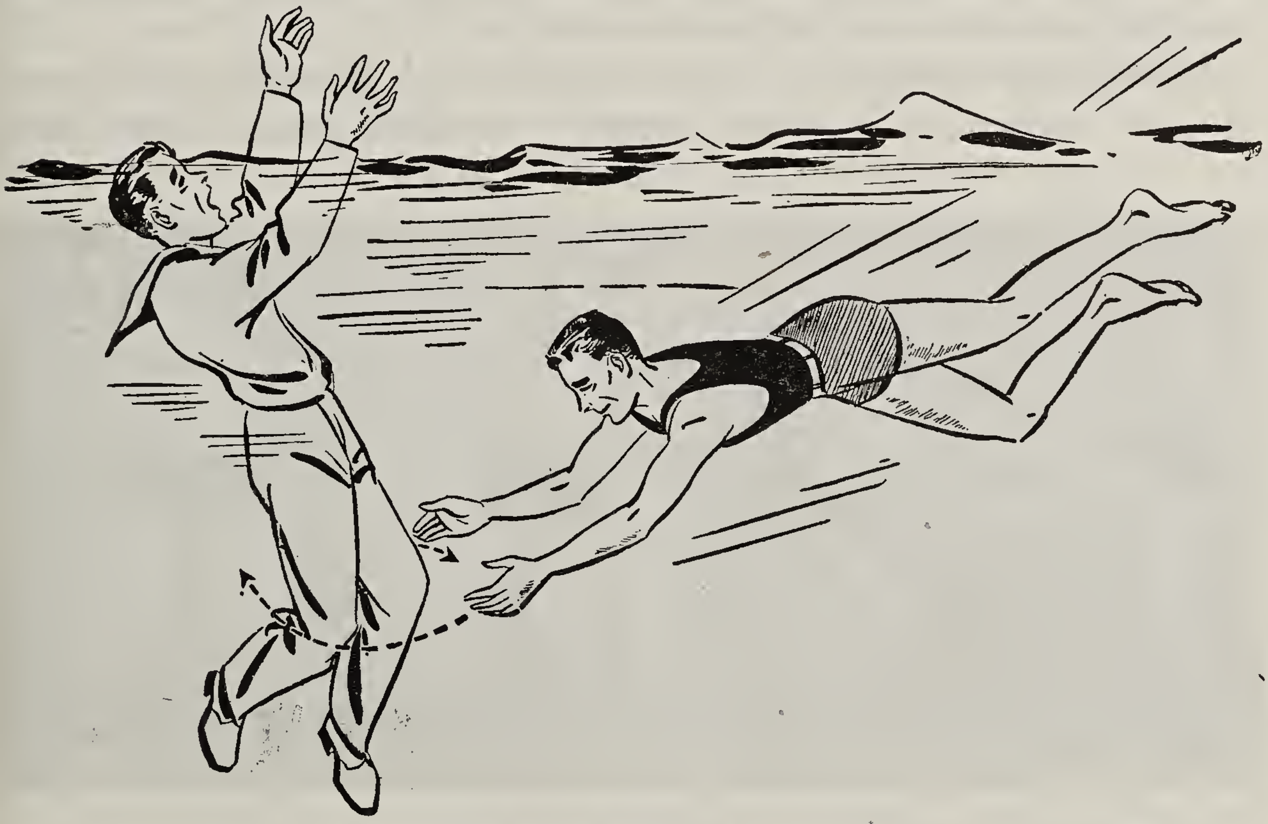


FIGURE 6-3.—Underwater approach.

part of your body or clothing. Try to reason with him as you approach him. If he does get a grasp on you, sink, taking him with you. If he is not too panicky, he will let go. Never strike a drowning man. His system has had sufficient shock to cause serious physical reactions. The added shock of a severe blow might be the cause of heart failure.

Lifesaving approaches. *Front approach.*—Swim slowly toward the victim. If he is not too far gone, try to calm him by talking to him. Tell him exactly what you are going to do and that he must obey your orders. Reach with your right hand for his left wrist. Turn his body slowly and use one of the carries described below.

Rear approach.—If the victim is too excited to pay attention to your directions, swim behind him, grasping his chin with the right hand, apply pressure on his back with your left hand, and use one of the various carries.

Underwater approach.—The underwater approach is by far the safest because the drowning person does not have a chance to get a grip on you. Swim to within 10 feet of the victim, surface dive to a depth at which you can easily reach his legs. If he is facing you, turn his back toward you by pressure on his upper legs. Slide your right hand up his back and grasp him by the chin, applying pressure to his back with the left hand. Bring him to the surface as quickly as possible and use one of the various carries.

Lifesaving breaks.—If the victim succeeds in getting a grip on you, the method of breaking depends on which part of your body

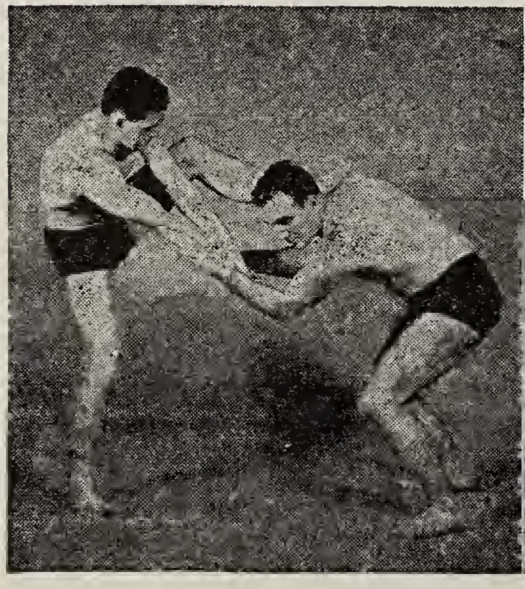


Figure 6-4.—Breaking wrist lock.

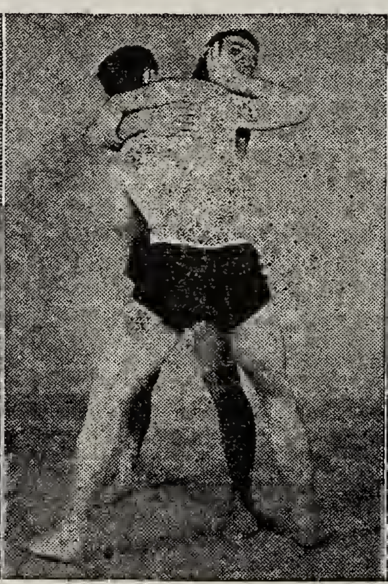


Figure 6-5.—Breaking front stranglehold.

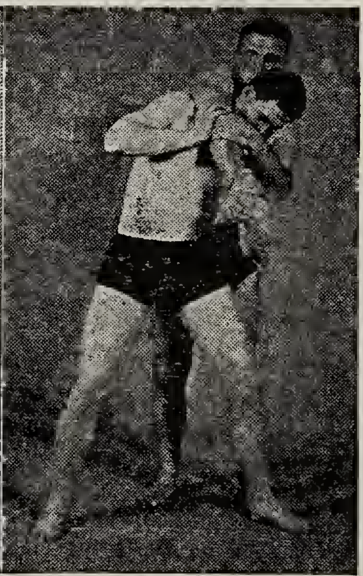


Figure 6-6.—Breaking back stranglehold.

he is holding. The first step is to sink with the victim. Take your time and do not get excited. When you go into the actual movement of breaking the grip, do so suddenly and with all your strength so that it works the first time.

Wrist lock.—If the victim has you by your left wrist, seize his right wrist with your free right hand. Move close to him, doubling up your right leg, placing your right foot on his left shoulder. Apply pressure suddenly with your foot, twisting yourself away from him and breaking his grasp. Turn his body by the right wrist to the left, bring him to the surface, and use one of the carries. If he has you by the right wrist, reverse the procedure.

Front stranglehold.—If the victim's chin is over your left shoulder, seize his left elbow with your right hand. Slide your left hand between his face and yours, along his left cheek. Apply pressure suddenly to his head with your left hand, shoving up with your right and twisting to the left from his grasp. Hold on to his left elbow with your right hand. Turn his body to your right, passing his elbow to your left hand. Bring him to the surface and use one of the carries. If the victim's chin is over your right shoulder, reverse your hands and proceed as described.

Back stranglehold.—If the victim grabs you with his right hand holding his left wrist, grasp his right hand with your left. Place your right hand under his right elbow. Suddenly twist his right wrist down. Exert pressure on his right elbow and turn your head to the left. Push up, bringing his arm around behind his back. Release your hand from his elbow and place it over his right shoulder and under his chin, bringing him to the surface. In the event that his head is over your left shoulder, reverse the procedure.

Breaking two drowning people apart.—Decide quickly which of the two victims you are going to rescue first. Approach him from the rear. Place both your hands over his shoulder and grip them together under his chin. Use your right or left leg, depending upon which is most convenient, to apply pressure on the chest of the other victim over the shoulder of the first to be rescued. Shove suddenly and pull the victim upward to the surface.

Lifesaving carries. *Hair carry.*—This is the easiest of the carries because it allows the most freedom of movement on the part of the rescuer. Turn on your left side. Slide your right hand up the back of the victim's head to the top, grasping the hair tightly. Use your left arm and legs for swimming side stroke. You may swim on either side, changing hands when necessary in order to rest.

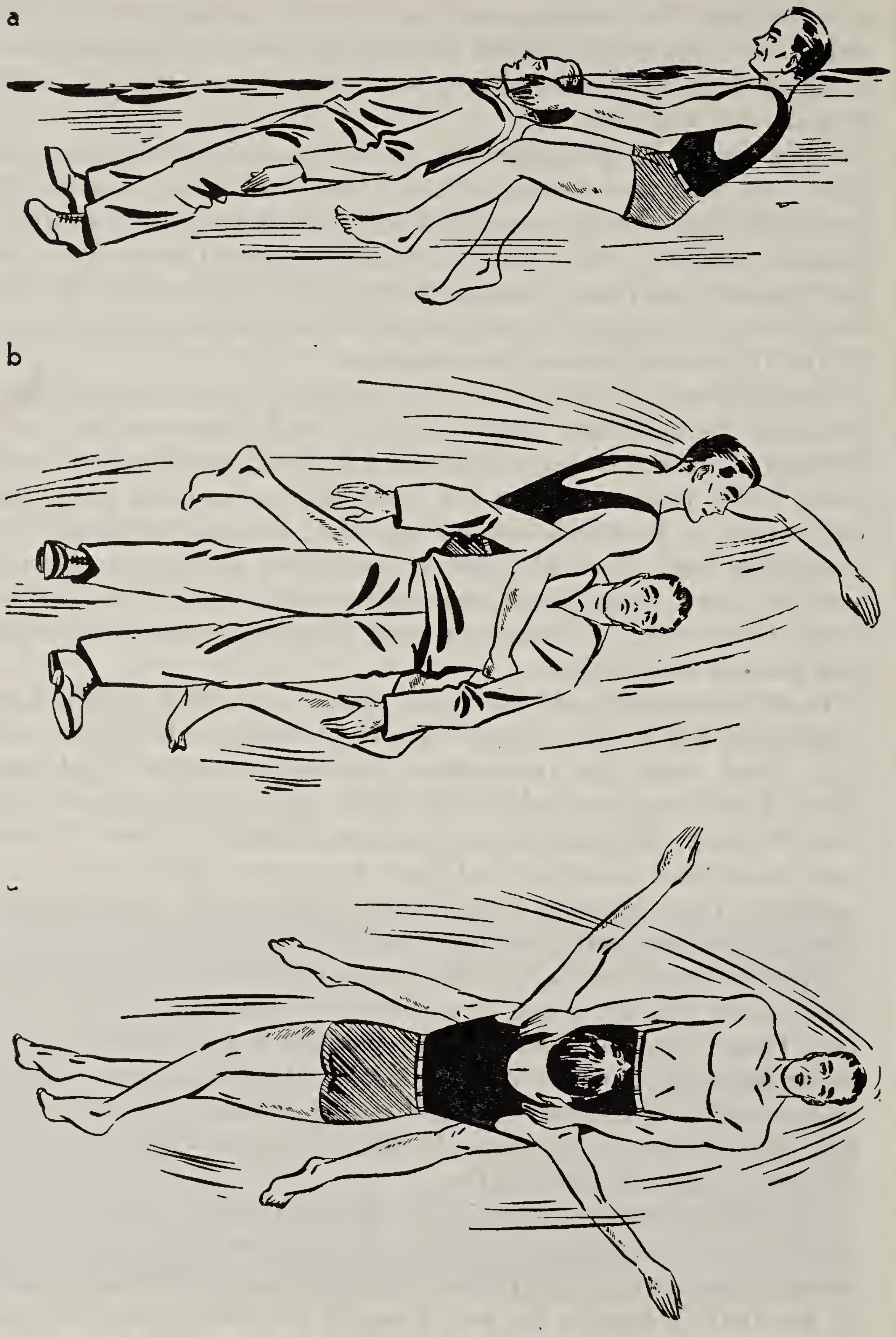


Figure 6-7.—LIFESAVING CARRIES: a. Head carry; b. Chest carry; c. Tired swimmer's carry.

Head carry.—Swim on your back. Hold the victim's head above the water with both of your hands meeting under his chin.

Cross chest carry.—This may be done from either side. Turn on your left side. Place your arm over the victim's right shoulder across his chest and under his left arm. Support his body on your right hip using your left arm and both legs to swim side stroke. This carry should not be used unless the victim is in bad condition, nor should it be used for long distances because it is most tiring.

Tired swimmers carry.—If the victim has enough control of himself to obey your orders, tell him to turn on his back, look at you, spread his legs and place both of his hands on your shoulders, with his arms stiff. You assume the position for breast stroke and swim, pushing him ahead of you. This is a useful stroke because it leaves both your arms and legs unhampered for swimming and tires you only a little quicker than ordinary swimming.

Carries from the water.—The most common carry is the *fireman's carry.* When you have reached shallow water, stand the victim up temporarily, place your right arm between his legs, and throw his body over your right shoulder. Grasp his right wrist with your right hand, so that your left arm is free.

A convenient carry for short distances is the *saddle back.* Bring the victim into water shallow enough so that you can stand waist deep. Move his body around behind you, his head to your right. Throw your arms around his body and hoist him across your back. Lean forward and carry him ashore.

ARTIFICIAL RESPIRATION

Place the victim face down on the ground with his right arm bent at the elbow, right forearm at right angles to the body. Put his head on his forearm with his face to the left. This position prevents swallowing the tongue or gagging during the process of artificial respiration. Kneel so that your knees are on either side of his knees. If he is large or fat, you can straddle one of his legs. Run your hands down his sides until you reach the bottom of the ribs. Stiffen your arms and raise yourself slowly, applying pressure to his ribs. As you do so, count slowly, "one, two, three, four." On the fourth count remove your hands suddenly, allowing the victim's lungs to fill with air. Move your body back, counting slowly, "five, six, seven, eight." Upon completion of the eighth count, repeat the process.

Start artificial respiration as soon as possible. Keep the victim

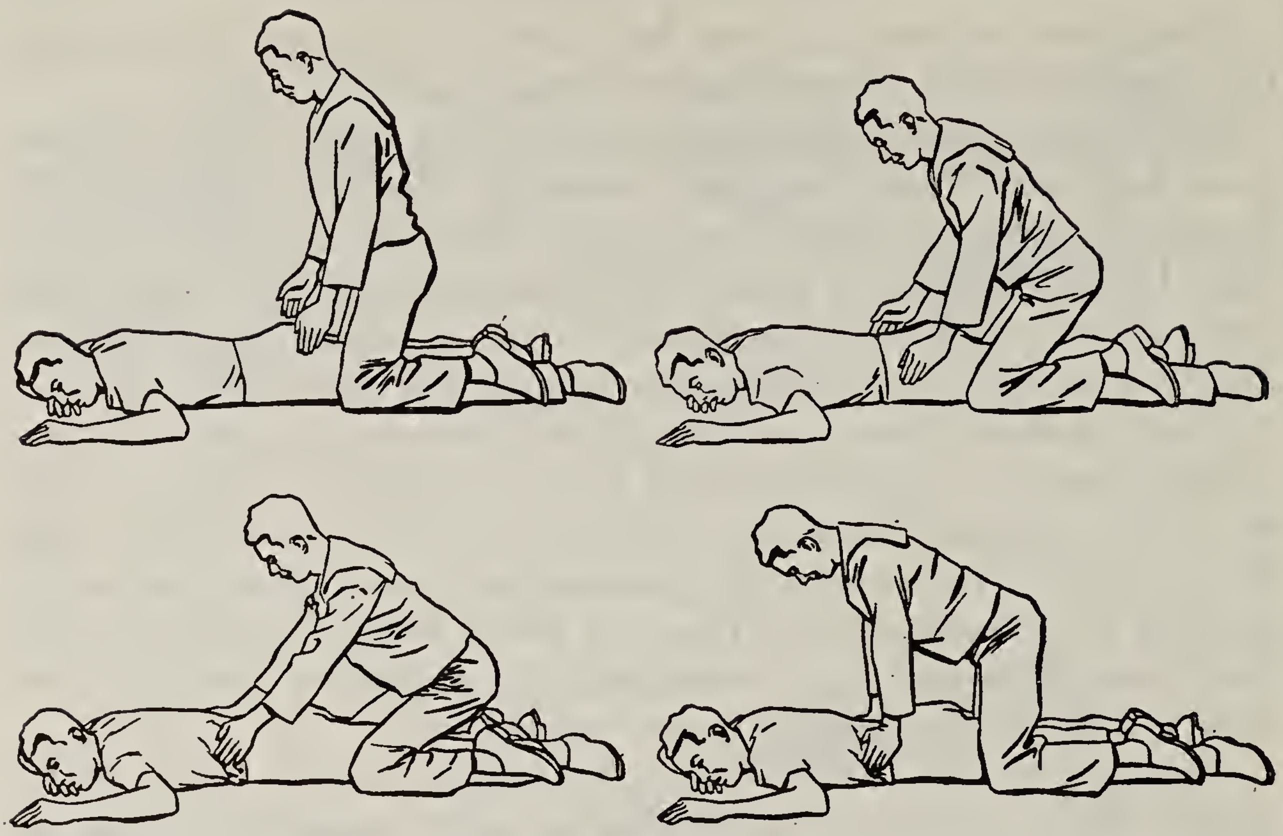


FIGURE 6-8.—Applying pressure to the lower ribs in administering artificial respiration.

warm, but do not give any stimulants whatsoever. Once you have started prone pressure do not stop until a doctor arrives or until you are absolutely certain that the victim cannot be revived. Drowning people have recovered after as long as four or five hours of prone pressure. The person administering artificial respiration can be relieved by others so long as the rhythm is not broken. In applying pressure to the victim's ribs be careful not to chafe or rub the skin too much. Make the movement a rhythmic one. Give the victim plenty of air and do not allow people to crowd around.

This method of artificial respiration has saved thousands of lives. Practice it under the supervision of someone who knows it until you can do it well. You never know when it may be necessary for you to use it.

CHAPTER 7

Recreation, Educational and Special Services

The Navy has full responsibility for the welfare, education and recreation of Naval personnel on all ships and shore stations. The Navy considers these needs so important that it has trained hundreds of men to direct these activities.

RECREATION

Recreation officer.—A line officer called the Recreation Officer is usually in charge of recreational activities; however, aboard most ships and at stations with small complements, the Chaplain sometimes directs these activities.

Athletics.—At training stations and other shore stations you may take part in major sports, such as baseball, swimming, basketball, boxing, wrestling, football and track. At some stations facilities are provided for other sports, such as badminton, handball, soccer, softball and tumbling. All of these activities are intended to help personnel keep in good physical condition.

EDUCATIONAL SERVICES

Off-duty education.—The Navy gives all men the opportunity to study almost any subject through its Educational Services program. This program will help you to complete your school or college education, to study for a postwar job and to get ahead in the Navy. The methods of studying are group instruction, correspondence courses, college extension courses and self-teaching. There are some 72 subjects which can be studied by correspondence, and 7,000 by college extension courses through the Armed Forces Institute. For further information, see your Chaplain or Commanding Officer. Enrollment in group instruction is free; it costs only $2.00 to enroll for a correspondence course. If you want to take a college extension course, the government will pay half the cost of texts and tuition, up to the amount of $20.00.

War orientation.—Every ship and station has a war orientation program to give an overall picture of the day-to-day events of the war. At the shore stations maps are posted and lectures given to keep you informed about the battlefronts of the world. This same service furnishes weekly news maps, broadcasts, bulletins, summaries and various pamphlets about the war.

SPECIAL SERVICES

Ship and station libraries.—Every Navy ship and station has a library. It carries the latest best sellers and includes fiction, nonfiction and a variety of technical books. The library will help men in their off-duty studies and in striking for a rate.

The Navy Relief Society.—The Navy Relief Society is an organization which assists in providing hospitalization, medical and surgical care for dependents of Naval personnel and gives financial aid in time of emergency. There are branch offices of this organization in various cities and at Naval stations throughout the United States. Where there is no office, the American Red Cross will help you to get in touch with the society.

The American Red Cross.—The Home Service department of the American Red Cross will transmit emergency messages for servicemen and their dependents when commercial cable service is not available. The American Red Cross Field Director at your station or base will help you with personal and family problems.

Ship's service.—The following services aboard ship or at shore establishments are under the direction of the Ship's Service Officer: ship's service store, laundry, tailor shop, cobbler shop, barber shop and photography service. The nominal profit made from ship's service activities is used under the direction of the Commanding Officer to promote the welfare of the crew.

Ship's store.—Aboard ship, where ship's service is not available, the ship's store carries supplies necessary for the personal cleanliness, health and comfort of the ship's company. Sales in the ship's store are on a cash basis only. Some of the articles sold are: toothpaste, shoe polish, stationery, blankets, toothbrushes, combs, pens and ink, clothing, soap, hairbrushes, candy, razors, shaving soap and brushes, nail clippers.

Post office.—The class of post office on the ship or station depends on the size of the complement, but it usually handles all of the functions of a civilian post office. Most ship or station post offices sell postage stamps, money orders, postal savings stamps and war bonds. Postal money orders are recommended for paying bills or sending money home.

CHAPTER 8

Naval Customs and Courtesies

The observance of Naval customs and courtesies is the "follow-through" of discipline. It is expected that every Navy man will observe the Navy's customs and courtesies, not because he has to, but because he takes pride in doing so. Some of the honors and ceremonies of the Navy, such as manning the rail, full dress uniforms and saluting foreign ships, are not observed during time of war.

THE SALUTE

The Naval custom most frequently observed is the salute. In no way is it a sign of humility or inferiority; it is a courtesy which has been observed for centuries by military men of every nationality. Men sometimes "forget" to observe this courtesy because they don't know how or when to render the salute.

Rules for saluting.—1. Men render the salute to all officers of the Army, Navy, Marine Corps and Coast Guard, and to officers of the armed forces of Allied nations.

2. A junior always salutes a senior; an enlisted man salutes an officer. The officer saluted returns the salute.

3. It is better to salute, even if in doubt, than to neglect military courtesy by not saluting.

4. Navy men render the salute only when covered.

5. All salutes in passing or approaching are begun by the junior at 6 paces from the nearest point of passing.

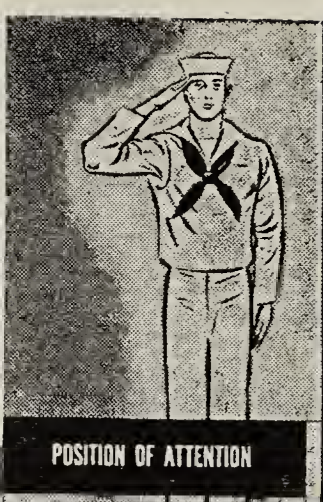
6. The salute is given with the left hand when the right hand is occupied and cannot be disengaged.

7. On board ship, enlisted men salute all officers junior to the Captain on their first daily meeting or passing near, and whenever addressed by them or addressing them. At other times they clear the gangway and stand at attention, facing the officer until he has passed. The Captain is saluted at every meeting.

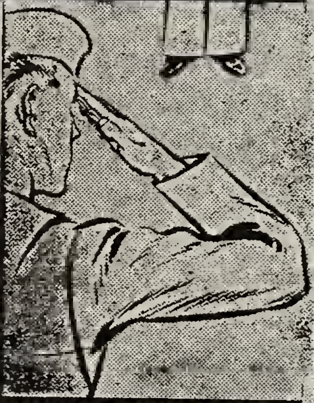
8. All men salute any officer making an inspection.

9. Men engaged in work continue working and stop to salute only when addressed by an officer or called to attention.

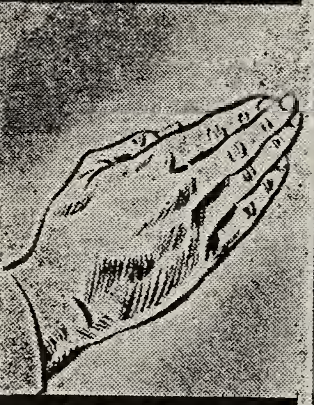
SALUTING CORRECTLY



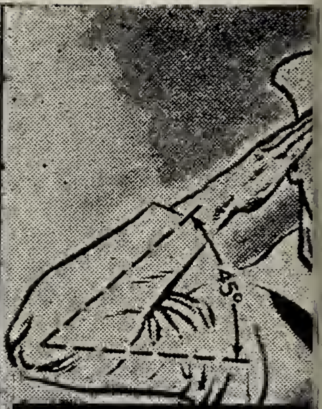
POSITION OF ATTENTION



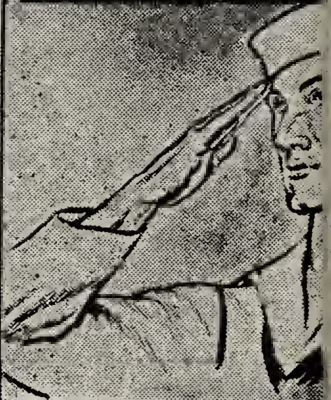
UPPER ARM PARALLEL TO GROUND, ELBOW SLIGHTLY FORWARD



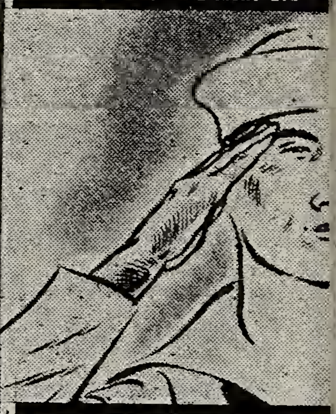
THUMB AND FINGERS EXTENDED AND JOINED



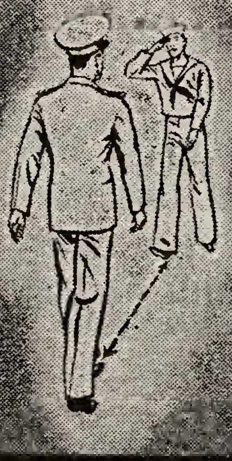
FOREARM INCLINED AT 45°



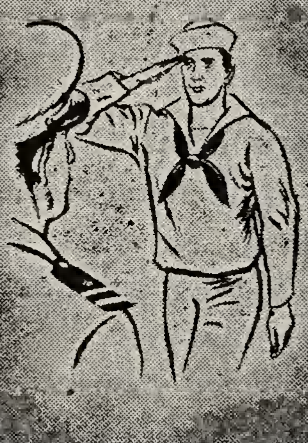
TIP OF FOREFINGER TOUCHING SLIGHT
TO RIGHT OF THE RIGHT EYE



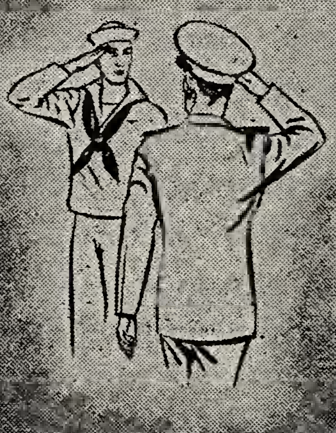
HAND AND WRIST IN A STRAIGHT LINE
PALM SLIGHTLY INWARD



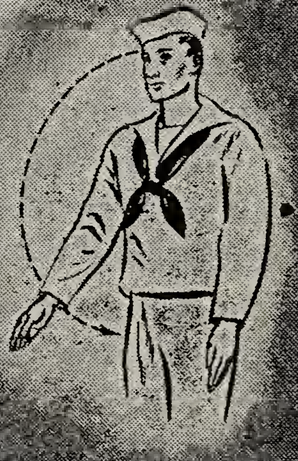
SALUTE BEGUN WHEN AT LEAST SIX PACES FROM PERSON SALUTED



HEAD AND EYES TURNED TOWARD THE PERSON SALUTED



POSITION HELD UNTIL OFFICER HAS RETURNED SALUTE, OR PASSED



SALUTE COMPLETED SMARTLY, AS HEAD AND EYES TURN FRONT

10. Men in formation do not salute when addressed by an officer but come to attention, if at rest.

11. Enlisted men in the stern sheets of a boat always rise and salute when a commissioned officer enters or leaves the boat.

12. Enlisted men in boats not under way and not containing an officer stand and salute when an officer comes alongside, leaves the side or passes near. They remain standing until the boat passes or reaches the ship's side. If boat awnings are spread men salute without rising.

13. Men seated and not working rise at the approach of an officer, face him and salute.

ETIQUETTE TO OFFICERS AND CIVILIANS

When an enlisted man receives an order from an officer, the proper reply is "Aye, aye, sir," which means "I understand the order and I will obey." Never say "Very good, sir," or "Very well, sir."

Men who are seated at work, at games or at mess are not required to rise at the approach of an officer, other than the Captain or an officer of flag rank, except when called to attention or to clear a gangway.

When an officer enters the room "Attention" is called by the first man who sees him. All men rise and remain standing at attention, uncovered, until the officer leaves the room or until he gives the order "As you were," or "Carry on."

To clear a passage for an approaching officer, "Gangway" is called by the first man who sees that the way is blocked. This courtesy is extended to civilians as well as officers.

An officer always boards a boat after enlisted men and leaves before them. The same applies to a room, an automobile or an elevator. Enlisted men should not encroach upon officers' seats unless so ordered by the O.O.D. when embarking in a boat, or the Master-at-arms at the movies.

The bugle call "Attention" is a signal for every man on board ship to stand at attention and face the person for whom "Attention" is sounded, if he can be seen; otherwise, stand at attention, facing outboard. However, men inside the ship on covered decks, if not in sight through gun ports or other openings, are not required to obey the bugle call, but they must remain silent until "Carry on" is sounded.

Because you are in uniform, you are extended many privileges ashore. Civilians are proud of our fighting men. Show that their pride is justified by being polite and orderly at all times.

COLORS

The ceremony of raising the National Ensign or flag in the morning, and lowering it at sunset, is known as *making colors.* The following ceremony is observed at colors. The bugler, guard of the day, and the band, if any, are present. At morning colors the band plays the national anthem, at the beginning of which the ensign is hoisted smartly to the peak of the truck. All officers and men face the ensign and salute as described for rendering honors to the national anthem. The guard of the day and sentries under arms come to the position of "Present arms" and so remain while the national anthem is being played, and until the bugle sounds "Carry On." If no band is available, the bugler sounds "Colors" in place of the national anthem, and the same salute is rendered.

The same ceremonies are observed at evening colors. The ensign starts down from the truck at the beginning of the national anthem, and is lowered slowly. The ensign is never allowed to touch the deck or the ground.

If warships of other nations are present, their national anthems are also played after ours at morning colors.

THE NATIONAL ANTHEM

Whenever the national anthem, "The Star Spangled Banner," is played on board a vessel of the Navy, at a Naval station, or at a place where persons belonging to the Naval service are present, all officers and men not in formation comply with the following:

1. Stand at attention and face toward the music, except at colors, when they face toward the colors.
2. If covered and in uniform, salute at the first note of the anthem and retain the position of salute until the last note of the anthem.
3. If covered and not in uniform, uncover at the first note of the anthem and hold the hat over the heart until the last note of the anthem.

The same courtesies are observed during the playing of the national anthem of any Allied nations upon official occasions. The playing of the national anthem of the United States or of any other country as part of a medley is prohibited.

QUARTER-DECK AND GANGWAYS

The Commanding Officer defines the limits of the quarter-deck. It covers as much of the main or other deck as may be necessary for official and ceremonial functions.

The starboard gangway is used by commissioned and warrant officers and their guests; the port gangway by all other persons. In heavy weather the lee gangway is used by everyone.

Each officer and man whenever reaching the quarter-deck, either from a boat, from a gangway, from the shore or from another part of the ship, salutes the ensign. The person making the salute stops at the top of the gangway, faces the colors and renders the salute, after which he salutes the Officer of the Deck. In leaving the quarter-deck the same salutes are rendered in reverse order.

The same salutes are given when men leave the ship on liberty and when returning aboard. Before saluting the colors, the man salutes the Officer of the Deck and says, "I request your permission to leave the ship, sir." When coming aboard, he salutes the colors and then says, "I request your permission to come aboard, sir." Men in formation coming aboard or leaving the ship salute the quarter-deck but do not salute the Officer of the Deck. The petty officer in charge of the formation salutes the Officer of the Deck, his salute sufficing for the entire party.

THE BOATSWAIN'S PIPE

The boatswain's call can be traced back to the days of the Crusades. In the 15th century it was used by the English as a badge of rank, and about 1671 it was referred to as a "call." In our Navy it is called the "bo'sun's pipe."

Even though there are loud-speaker and inter-communication systems on modern ships, the boatswain's pipe also is used for calling and passing the word. The various calls and their meanings are as follows:

1. *Word to be passed.* Piped to command silence before passing an order or information.
2. *All hands.* Piped to call all hands' attention; also for calling the first, mid, and morning watches.
3. *Boat call.* Piped to call away a boat; also to call a division or divisions to quarters.
4. *Call mates.* Piped by the boatswain to assemble his mates.
5. *Stand-by.* Piped for set taut, stand-by, and lay on.

6. *Hoist away.* Piped in hoisting boats, in hoisting generally, and in the walk away with cat or fish falls; always preceded by the pipe "Stand-by."

7. *Haul.* Piped to keep men pulling together.

8. *Belay.* Piped to cease hauling and make fast; and also to cease an order just piped.

9. *Heave around.* Piped for mess gear; also to heave around a capstan.

10. *Veer.* Piped to ease away, walk back and slack away.

11. *Lay up.* Piped to send men aloft.

12. *Lay out.* Piped to lay out in manning yards or rail; also for trice up and out booms.

13. *Piping the side.* Accompanies appropriate side honors.

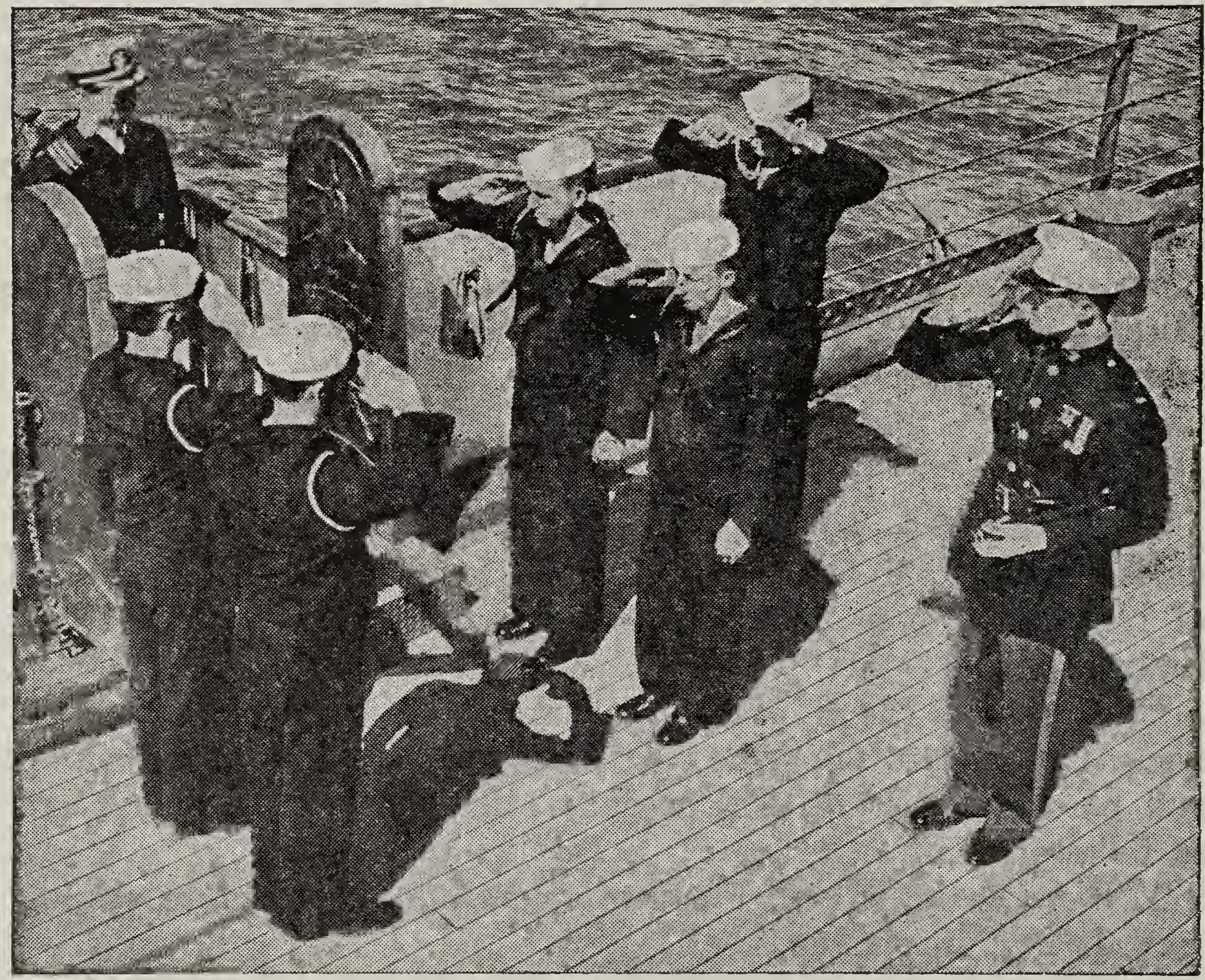


FIGURE 8-2.—Piping an officer-visitor over the side.

SIDE BOYS

In peacetime side boys are stationed within call of the Officer of the Deck from 0800 to sunset, except during mess and general drills, to tend the gangway when officers leave or come on board the ship. Seamen second class are usually detailed as side boys. The side may be tended with from 2 to 8 boys, by twos, depending upon the rank of the officer honored. One pipe of the boatswain's call means 2 side boys; two pipes, 4; three pipes, 6; and four pipes, 8. On hearing the pipe, the side boys come to the gangway on the double. They are stationed on either side at attention, to form a passageway. They salute together at the first note of the pipe, and finish the salute together on the last note. The boatswain's mate gives the order to secure.

CHAPTER 9

Organization of the Navy

THE NAVY AND THE GOVERNMENT

The Navy's primary duty is to enforce the United States foreign policy, and to protect our country and our shipping from aggressive action by other nations. Our policies are formed by the President of the United States and the Secretary of State, with the advice and consent of the Senate. An example of our foreign policy is the Monroe Doctrine, which states that no foreign power may take over any country in this hemisphere for purposes of conquest and colonization. The Navy has been called upon several times to uphold the Monroe Doctrine. History shows that we must be ready at all times to meet any emergency. Trouble may start unexpectedly, as we all learned when Pearl Harbor was bombed by the Japanese.

Command of the Navy. *The President.*—Under the Constitution of the United States, the President is the Commander in Chief of both the Army and the Navy.

The Secretary of the Navy (SecNav).—Appointment of the Secretary of the Navy is made by the President, by and with the consent of the Senate, and he is a member of the President's Cabinet. The Secretary receives orders from the President and is responsible for the operation of the Navy. He is aided in these duties by an Under Secretary, an Assistant Secretary, and an Assistant Secretary for Air.

Commander in Chief, United States Fleet (CominCh).—Our Fleet is the heart of the Navy. The President, with the advice and consent of the Senate, appoints an officer of the Line of the Navy as Commander in Chief, United States Fleet. The officer holding this position has the rank of admiral and also assumes the title and duties of Chief of Naval Operations (CNO). Under the direction of the Secretary of the Navy, he is charged with the plans and operations of the Fleet. The United States Fleet is theoretically a single fighting unit, but for strategic purposes and for operations in various theaters of war it is divided into separate forces, some of which are also called fleets—for example, the Atlantic Fleet and

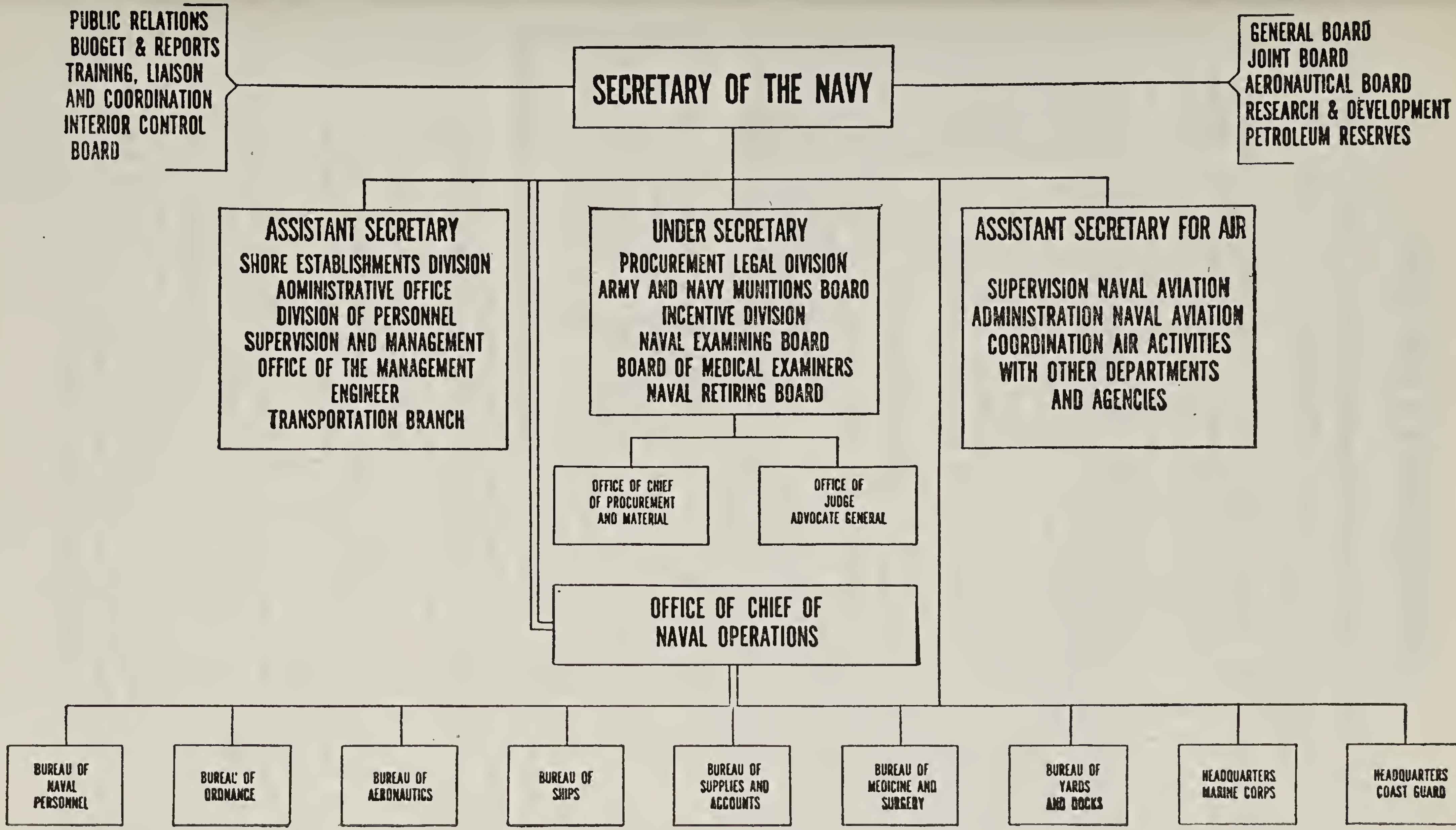


FIGURE 9-1.—Navy Department Organization Chart.

the Pacific Fleet. These are each commanded by a Fleet Commander in Chief. The number, size and designations of our several fleets change from time to time.

Bureaus and offices.—The Navy Department is divided for administrative purposes into bureaus and offices. Each bureau is in charge of an officer of flag rank, usually rear admiral, who holds the title of Chief of the Bureau. The chiefs of bureaus are responsible to the Secretary of the Navy for the administrative functions assigned to them. Chiefs of the bureaus of Naval Personnel, Ships, Ordnance and Aeronautics are officers of the Line. The Chief of the Bureau of Medicine and Surgery is an officer of the Medical Corps; the Chief of the Bureau of Yards and Docks is an officer of the Civil Engineer Corps; the Chief of the Bureau of Supplies and Accounts is an officer of the Supply Corps.

Bureau of Naval Personnel (BuPers).—This bureau is responsible for the procurement, education, training, discipline and distribution of officers and enlisted personnel of the Navy, except for certain training functions of the Bureau of Medicine and Surgery and the Bureau of Aeronautics. Your recruit training is planned and directed by this bureau.

Bureau of Medicine and Surgery (BuMed).—This Bureau takes care of the sick and wounded; the upkeep and operation of all hospitals; the sanitation of ships and stations; physical examination of personnel in the Navy; training of the Hospital Corps; and supply of all medical and dental materials.

Bureau of Ships (BuShips).—Ships are designed, built, fitted and repaired under the direction of this bureau.

Bureau of Ordnance (BuOrd).—This bureau is in charge of all ordnance establishments of the Navy, such as magazines, the Naval Gun Factory, mine depots, torpedo stations and proving grounds. It is also responsible for the design, manufacture, upkeep and operation of the weapons of the Navy and the repair of ordnance equipment aboard ship.

Bureau of Yards and Docks (BuDocks).—This bureau has charge of the design, construction, repair, upkeep and operation of public works and public utilities of the Navy. In peacetime the Naval shore establishments were built by civilian workers. In order to build shore establishments in combat zones, this bureau has organized Construction Battalions, consisting entirely of Navy men, called "SeaBees," They build roads, docks, airfields, supply bases, personnel

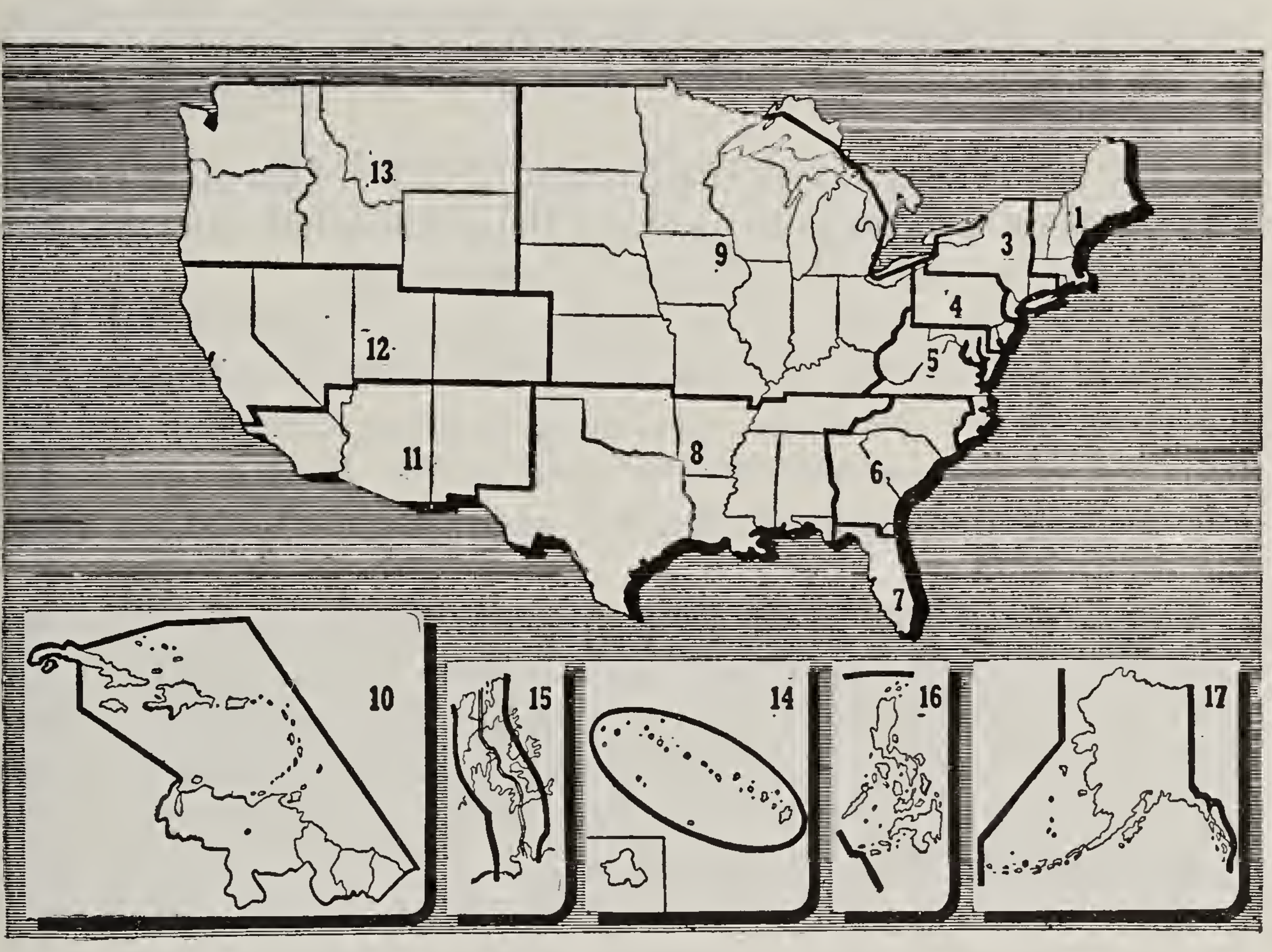


FIGURE 9-2.—For administrative purposes United States territory is divided into 16 Naval Districts. This map shows the 16 districts. There is no District 2.

facilities, hospitals, repair shops, ammunition dumps and many other facilities.

Bureau of Supplies and Accounts (BuSandA).—This bureau has charge of the purchase, storage, care, shipment, issue and accounting for all supplies and property of the Navy, except certain supplies for the Bureau of Medicine and Surgery.

Bureau of Aeronautics (BuAer).—This bureau is responsible for the design, purchase, repair, building and fitting out of all aircraft. It also has charge of advanced training for men in the Navy Air Corps.

Office of the Judge Advocate General (JAG).—This office handles all matters of law arising in the Navy Department and supervises and reviews the conduct and findings of courts-martial.

The Marine Corps.—The Marine Corps is commanded by a lieutenant general. He is responsible to the Secretary of the Navy for the procurement, discharge, education, training, discipline and distribution of officers and enlisted men of the Marine Corps. The administration and general efficiency of the Marine Corps are under his supervision.

The Coast Guard.—In time of peace the Coast Guard comes under the supervision of the Treasury Department. In time of war the Coast Guard operates as a part of the Navy, and as a separate division of the Navy. The Coast Guard is commanded by an officer holding the rank of vice admiral who is responsible for the efficiency and administration of the service.

The Women's Reserve.—The purpose of the Women's Reserve is to aid the war effort by releasing officers and men for duty at sea. The Women's Reserve of the Navy (WAVES) is administered by the Bureau of Naval Personnel; the United States Marine Corps Women's Reserve (Marines) by the Marine Corps; and the Women's Reserve of the Coast Guard (SPARS) by the Coast Guard.

RANK OF COMMISSIONED OFFICERS

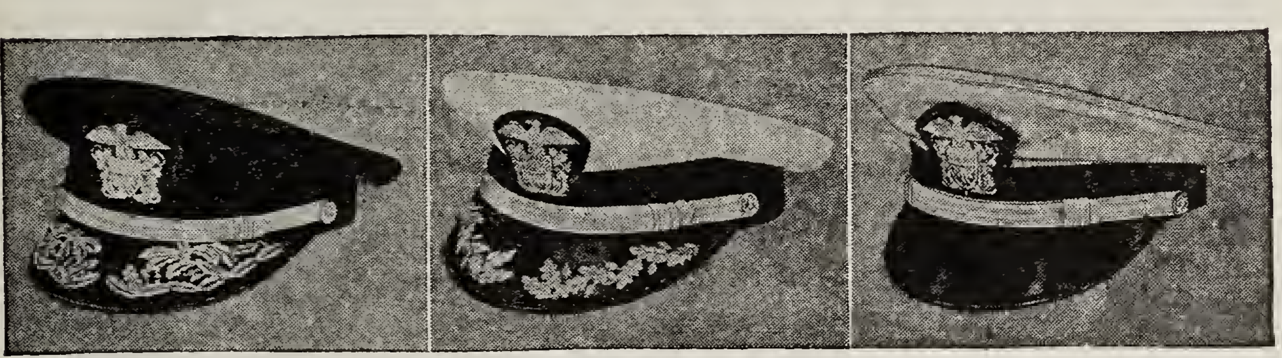
Line officers are those men trained and qualified to exercise military command. *Staff* officers are those assigned to a particular corps.

Following is a list showing officer ranks in the Navy and the comparable ranks of the Army, Marine Corps and Coast Guard. The illustration on pages xvi and xvii shows comparable sleeve and shoulder marks for the U. S. Armed Services.

Navy	*Army*	*Marine Corps*	*Coast Guard*
Admiral	General		
Vice Admiral	Lieutenant General	Lieutenant General	Vice Admiral
Rear Admiral	Major General	Major General	Rear Admiral
Commodore	Brigadier General	Brigadier General	Commodore
Captain	Colonel	Colonel	Captain
Commander	Lieutenant Colonel	Lieutenant Colonel	Commander
Lieutenant Commander	Major	Major	Lieutenant Commander
Lieutenant	Captain	Captain	Lieutenant
Lieutenant (junior grade)	First Lieutenant	First Lieutenant	Lieutenant (junior grade)
Ensign	Second Lieutenant	Second Lieutenant	Ensign

Flag Officers of the Navy

Admiral Vice Admiral Rear Admiral Commodore



Flag officers Captains and Commanders Lieutenant Commanders and below

FIGURE 9-3.—Officer's caps.

RANK OF WARRANT OFFICERS

The following is a list of the ratings and comparable ranks of warrant officers in the Navy, Coast Guard, Army and Marine Corps.

Navy and Coast Guard	*Army*	*Marine Corps*
Chief Warrant Officer	Chief Warrant Officer	Commissioned Warrant Officer
Warrant Officer	Warrant (junior grade)	Warrant Officer

CHAPTER 10

Program of Enlisted Training

CLASSIFICATION OF ENLISTED TRAINING

Enlisted training is carried on in schools designated for that purpose, and through printed training courses planned to be used aboard ships but now used in a wide variety of training activities on shore as well.

Training schools, though designed to provide specific training in many fields, may be divided into the following categories:

Recruit training.—This is the basic indoctrination training given all enlisted men upon their entry into the service.

Elementary schools.—These schools draw their students from recruit training. They are designed to assist the forces afloat by giving such elementary instruction to the recruits as will make them more immediately useful and provide them with the groundwork necessary to strike for the lowest petty officer ratings. Elementary schools are called Class "A" Schools.

Advanced schools.—These schools draw their students from elementary schools, districts and the fleet. They are designed to supplement the training afloat or give advanced training when such training can be given more advantageously ashore. Advanced schools include Class "B" Schools, Class "C" Schools and supplementary schools. There is at present no clear line of demarcation between Class "B" and Class "C" Schools other than administrative distinctions. Supplementary schools are highly specialized and are usually factory schools.

Operational schools.—These schools provide training for both officers and men. They draw their students from all sources of supply and are designed to train for a special activity. When a complete crew with Commanding Officer is the unit to be given pre-commissioning training for a specific ship, the school is under the cognizance of the Fleet Operational Training Commands.

Fleet service schools.—These schools are operated by the Bureau of Naval Personnel for the Fleet.

Fleet schools.—These schools are under Fleet cognizance and will not be considered in this publication.

NAVY TRAINING AND ADVANCEMENT IN RATING

The U. S. Navy has schools to train men for fighting duties. Men are selected for special school training to fill the Navy's needs and in accordance with each man's ability, education, physical condition and conduct. Navy men who meet all of these qualifications may be selected for training, but the number of men selected depends upon the needs of the Navy. What these needs are is illustrated by the list of "Ratings of Enlisted Personnel" beginning on page 78.

STRIKING FOR A RATE

Men who are not selected for Navy school training have a chance to learn a special job and strike for petty-officer rating on board ships or at shore stations. A striker is a man selected from among non-rated men to work toward meeting qualifications for petty-officer rating. He is usually assigned duties related to the rating for which he is striking and is instructed in these duties by officers and petty officers. Division officers will furnish training course booklets to assist in qualifying for a rating. When striking for a rate, the general qualifications for advancement are:

1. Meet the requirements regarding length of service, which requirements vary with different pay grades
2. Have in his record the stipulated quarterly marks for proficiency in rating and conduct
3. Qualify in the practical factors that are prescribed for the higher rating
4. Pass a technical examination
5. Be recommended by the commanding officer
6. The Bureau of Naval Personnel must have authorized the filling of vacancies in the rating for which he is qualifying.

SERVICE SCHOOLS

In recruit training each Navy man learns the things *every* bluejacket has to know. To become a rated man, he must have special training. For this reason the Navy maintains Service Schools to which men are assigned upon completion of their recruit training or after a term of service afloat. Only men with the required qualifications are sent to Service Schools. These schools are grouped into three Classes.

Class A Schools.—Class A schools give basic instruction and train men for the lowest petty-officer ratings.

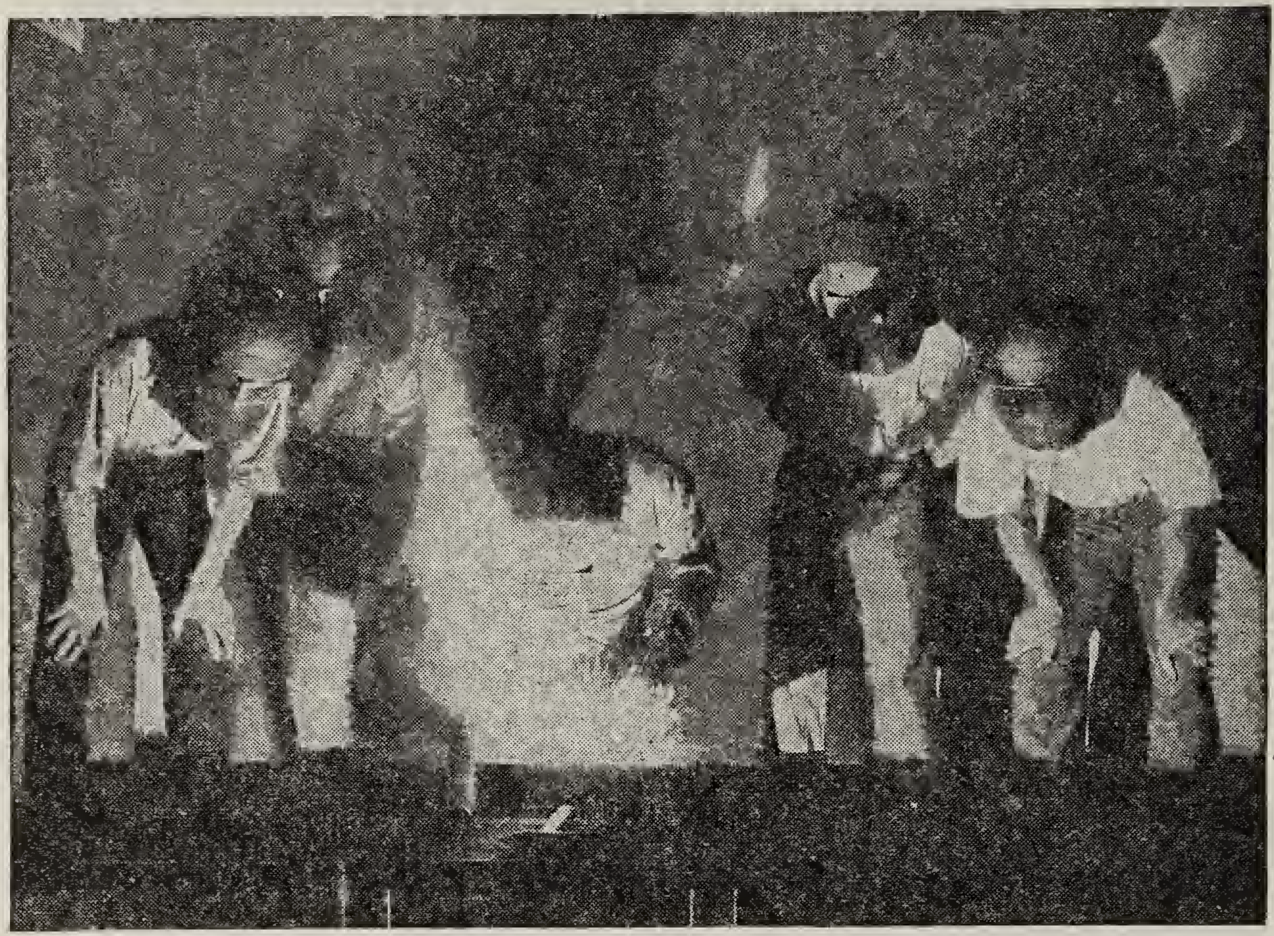


FIGURE 10-1.—Learning electric arc welding in a metalsmith's school.

Name	*Subjects*	*Weeks*
Air Transport Radio	Code sending and receiving; communication procedure; watch standing; practical operation and operational theory; semaphore; signal flags; blinker.	21
Aviation Electrician's Mates	Hand tools; aircraft nomenclature; blueprint reading; electrical circuits and measuring instruments; shop practice; maintenance of all aircraft instruments and electrical circuits.	12
Aviation Machinist's Mates	Drafting; ordnance; shop mathematics; hand tools; aircraft structural repairs; instruments; hydraulic equipment; disassembly and inspection; engine overhaul and testing; aircraft operations.	21
Aviation Metalsmiths	Shop mathematics; mechanical drawing and blueprint reading; aircraft nomenclature; shop theory and practice; forging; heat treatment; welding; sandblasting.	21

Name	*Subjects*	*Weeks*
Aviation Ordnancemen	Aircraft nomenclature; elementary shop mathematics; elementary electricity; machine guns and ammunition; gunsights and cameras; gun maintenance and adjustments; aerial targets and towing gear; bombs and torpedoes; bombsights; fuses; pyrotechnics and smoke equipment.	14
Aviation Radiomen	Code receiving and sending; radio communications procedure; interphone systems; hand tools; batteries and cables; lighting circuits and generators; aircraft recognition; semaphore and blinker.	18
Basic Engineering	Mathematics; mechanical drawing and blueprint reading; safety precautions; shop practice; machine tools; care and operation of motors.	8
Boilermakers	Foundry and blacksmith shop practice; shop mathematics; blueprint reading; hand and power tools; sheet metal work; pipe fitting; caulking and riveting; welding.	16
Buglers	Care of bugle and drum; routine calls and drum beats; duties, marches and steps.	16
Carpenter's Mates	Shop mathematics; mechanical drawing and blueprint reading; elementary mechanics; shop practice; hand and machine tools; boat structure and nomenclature; ship compartmentation; woods; paints and finishes.	16
Cooks and Bakers	Practical mathematics; commissary organization; galley regulations; sanitation; elementary nutrition and menus; food preparation; equipment; procurement and handling of provisions.	16
Coxswains	Small boat training.	16
Diesel	Theory and development; engine construction and parts; disassembly and assembly; operation and maintenance.	8
Electrical	Electrical theory and circuits; mathematics; electrical measuring instruments; direct and alternating current motors; generators and dynamos; transformers; interior communication circuits; telephones; search lights; gyrocompasses; batteries; use of hand tools.	16

Name	*Subjects*	*Weeks*
Fire Controlmen	Mathematics; hand tools; electricity; ship and aircraft recognition; telephones; operation and maintenance of fire control equipment.	16
Fire Controlmen (O)	Mathematics; electricity; recognition; hand tools; mechanical drawing; rangefinder optics; gunnery.	16
Gunner's Mates	Hand tools; construction and parts of guns; operation and care of small arms; lubrication and painting of guns; identification, handling and stowage of ammunition; depth charges.	12
Hospital Corps	Anatomy and physiology; hygiene and sanitation; weights and measures; materia medica; first aid and minor surgery; nursing.	6
Laundry	Laundry equipment and supplies; operation and maintenance of equipment; laundry regulations.	8
Machinist's Mates	Shop mathematics; hand and machine tools; characteristics of metals; gears and gearing; threads and screws.	16
Metalsmiths	Shop mathematics; shop practice; mechanical drawing and blueprint reading; hand and machine tools; strength and materials; sheet metal work; riveting; welding; protective coatings.	16
Molders	Shop mathematics; blueprint reading; foundry tools; foundry practice; casting and forging.	16
Pattern Makers	Shop mathematics; elementary mechanics; mechanical drawing and blueprint reading; metals and alloys; foundry practice; foundry tools; wood turning.	16
Pre-Radio Material	Elementary electricity; mathematics; slide rule; hand tools; shop practice; elementary radio theory.	4
Quartermasters	Blinker; semaphore; flag hoists; organization afloat; steering and helmsman duties; navigation and weather instruments; piloting and navigation; navigational aids; rules of the road; communications procedures; recognition of ships and aircraft.	16

Name	*Subjects*	*Weeks*
Radio	Typing; hand sending and copying; Fox copying; communications procedures; radio theory.	19
Shipfitters	Shop mathematics; mechanical drawing and blueprint reading; shop practice; hand and power tools; metals; sheet metal work; patternmaking; molding; blacksmithing; welding; boilermaking.	16
Signal	Communications procedures; blinker; semaphore; flag hoists; elementary navigation and navigation instruments; rules of the road.	16
Specialist (M) Mail	Organization of the Navy; regulations; communications procedures; naval correspondence; courts and boards; personnel records; classified publications; correspondence files; pay and allowances; postal laws and regulations.	11
Specialist (S) Shore Patrol	Navy regulations; naval customs and etiquette; first aid; shore patrol duties.	6 or 8
Storekeepers	Appropriations; funds and titles; purchasing; requisitions; accounting and records; issues and sales; pay and allowances; preparation of payrolls; allotments; deposits and vouchers; transportation and shipments; typewriting; Navy correspondence.	12 or 16
Torpedomen	Design and construction of torpedoes; inspection and maintenance; torpedo fire control; soldering and brazing; mines and depth charges.	16
Yeomen	Typewriting; naval correspondence and filing; Navy organization; publications; records and reports; duties of petty officers.	12 or 16

Class B Schools.—Class B schools give enlisted men advanced instruction. Second class and third class petty officers are sent to these schools from ships, and men who have taken a basic course in a Class A school may also be sent there.

The following is an alphabetical list of Class B schools.

Aerographer—Primary; Aircraft Heaters; Aircraft Instruments; Aviation Ordnancemen; Aviation Storekeepers; Bombsight; Bombsight and SBAE; Carburetors; Chief Commissary Stewards; Cooks and Stewards; Diesel; Divers, Second Class; Engine Maintenance; Gunner's Mates; Gunner's

Mates Ammunition and Ordnance; Gyrocompass; Hydraulics; Instruments; Line Maintenance; Optical—Primary; Propellers; Rangefinder Operators; Sound Motion Picture Technicians; Stenography; Torpedomen.

Class C Schools.—Class C schools give enlisted men advanced training for special assignments.

The following is an alphabetical list of Class C schools.

Aerial Cameras; Aeronautical; Aircraft Engines; Aircraft Instruments; Aircraft Turrets; Air Transport Service; Aviation Ordnance; Aviation Radio Material; Bombsight and SBAE; Buglemasters; Classification Interviewers; Control Tower Operators; Deep Sea Divers; Degaussing; Diesel—Advanced; Electric Interior Communications; Electronic Turbo-Supercharger; Elementary Electricity and Radio Material; Fire Control—Advanced; Fixed Gunnery; Flight Mechanics; Ground Cameras; Gunner's Mates and Electric Hydraulics; Hall Scott Engine; Helium Plant Operators; Instructor; Link Celestial Navigation Trainer; Link Instrument Trainer Instructor; Meat Specialists; Motion Picture Camera; Music; Naval Academy Preparatory School; Naval Auxiliary Preparatory School; Oil Burning; Optical—Advanced; Parachute Riggers; Physical Instructors; Pigeons; Radio Material; Special Devices; Steam Engineering; Torpedo, Electrical; Teacher Training School (EE and RM); Welders.

FLEET SERVICE AND OPERATIONAL SCHOOLS

These schools are maintained to give men special ability for duty aboard ship. Only men qualified in accordance with Bureau of Naval Personnel Manual requirements for admission to service schools are selected for further training at fleet schools, and the number of men selected depends upon the needs of the fleet.

The following are lists of Fleet Service and Operational Schools.

Fleet Service Schools

Advanced Fire Control; Advanced Gunner's Mates and Electric Hydraulics; Advanced Torpedo; Cooks and Bakers; Cooks and Stewards; Electric Hydraulics; Elementary Fire Control; Fire Control—Rangefinder-Spotters; Fire Fighters; Gyrocompass; Internal Combustion—Landing Craft; Internal Combustion Operators; Internal Combustion Repairmen; Machinist's Mates; Multilith Operators; Music; Torpedo—Elementary and Advanced; Welders; Welders—Advanced; Welders—Elementary; Welders—Underwater, Cutting and Welding.

Operational Schools

Ammunition Handling; Ammunition Packaging; Antiaircraft Training Centers; Armed Guard Gunnery; Armed Guard Schools; Armed Guard Visual; Bomb Disposal; Fire Fighter Schools; Floating Drydock Training Center; Lookout Training; Naval Air Gunners; Naval Air Navigation Radio; Net

Training School; Recognition; Salvage; Ship Repair Unit; Submarine School; Turbo-Electric.

FLIGHT SCHOOLS

There are two Navy flight training programs—V-5 (Aviation Cadet), leading to commission as Ensign, or Second Lieutenant, United States Marine Corps; and V-8, leading to the rate of Aviation Pilot, First Class. Candidates for both programs must meet certain physical qualifications.

Applicants for V-5 must have not less than eight months service on active duty. They must remain unmarried until commissioned. Graduation from high school is required, and the maximum age is 26. They must agree to remain on active duty four years, if needed.

V-8 applicants must have at least one year of service on active duty and be recommended by their commanding officer. The maximum age is 27 and applicants must agree to remain on active duty two years. An Aviation Pilot (V-8) may be considered for commission in the Naval Reserve.

Applications for both of these programs must be made through commanding officers.

THE NAVAL ACADEMY PREPARATORY SCHOOL

The Preparatory School of the Naval Academy provides a chance for enlisted men to study for admission to the U. S. Naval Academy at Annapolis. In order to qualify for the Preparatory School, an enlisted man must: (1) have completed 9 months active duty by July 1 of the year he desires to enter the Academy; (2) be not more than 21 years of age on April 1 of the year he desires to enter the Naval Academy; (3) have completed 3 years of high school or its equivalent; (4) be recommended by his commanding officer; (5) pass a rigid physical examination; (6) pass preliminary written examination covering algebra, geometry, physics, chemistry, U. S. History, English composition and literature; have qualifying score on General Classification Test.

COLLEGE PROGRAM

The Navy V-12 (college) program supplies officer candidates for the Navy, Marine Corps and Coast Guard through training offered in colleges and universities. This program is open to Naval recruits if they meet the following requirements: (1) be on active duty; (2) be citizens of the United States; (3) be morally and physically qualified, including a minimum visual requirement of 18/20; (4) be high school graduates; (5) be between 17 and 23 years old; (6) be unmarried and agree to remain unmarried until commissioned; (7) be recommended by their commanding officer; (8) pass a General Classification Test; and (9) accept rating of Apprentice Seaman while in the program.

PAY GRADES AND RATINGS OF ENLISTED PERSONNEL

All Navy men should know not only the grades of pay but the ratings for which it may be possible to train in one of the Navy's schools. This information follows.

Pay Grades.—The rates of pay for Navy men are fixed by law and vary from time to time as laws are changed.

The following table shows the pay grades for the various ratings, with the basic pay per month of each grade as established in 1942.

Grade	*Pay per month*	*Class or Rating*
1	$138	Chief petty officers, permanent appointment.
1A	126	Chief petty officers, acting appointment.
2	114	Petty officers, first class.
3	96	Petty officers, second class.
4	78	Petty officers, third class.
5	66	Nonrated men, first class.
6	54	Nonrated men, second class.
7	50	Apprentice seamen.

Note: Pay in the Steward's branch is the one exception to the above table. Cooks and Stewards are in pay grades 1-4 inclusive, and Steward's Mates 5-7 inclusive. There are no petty officers in this branch.

Extra pay.—In addition to the base pay shown in the table men receive further increases in pay as follows:

1. Men on duty where quarters or rations in kind are not furnished are granted daily allowances ranging from $2.75 to $5.00 a day, depending on the man's station. This allowance is controlled by Executive Order of the President and may vary from time to time.

2. For awards of the Congressional Medal of Honor, Distinguished Service Medal, Distinguished Flying Cross, or Navy Cross, $2.00 per month is added to the pay, beginning at the time of winning the medal and lasting during the service of the man.

3. For length of service the base pay is increased 5 per cent after

the first three years of service and 5 per cent additional for each 3 years' service thereafter, the total not to exceed 50 per cent.

4. Other additions to base pay are given for those men performing special services such as: crew's messmen, gun captains, gun pointers and gun director pointers, gun range finder operators, mail clerks, expert riflemen, expert pistol shot, sharpshooter, divers, submarine service and aviation duty involving individual flight orders.

5. After serving one year in the Navy an allowance of $35.00 is paid for the upkeep of clothing, which is paid in quarterly installments of $8.75. This allowance may be changed by law from time to time. Members of the Women's Reserve also receive an additional clothing allowance, the amount of which may be changed from time to time.

Ratings.—The following table shows comparable ratings in the Navy, Coast Guard, Army and Marine Corps. An illustration of sleeve devices for these ratings may be found on pages xvi and xvii.

Pay Grade	*Navy and Coast Guard*	*Army*	*Marine Corps*
1	Chief Petty Officer	Master Sergeant and First Sergeant	Sergeant Major and First Sergeant
2	Petty Officer First Class	Technical Sergeant	Technical Sergeant, Drum Major and Supply Sergeant
3	Petty Officer Second Class	Staff Sergeant and Technician 3rd Grade	Platoon Sergeant and Staff Sergeant
4	Petty Officers Third Class	Sergeant and Technician 4th Grade	Sergeant
5	Seaman and Fireman First Class	Corporal and Technician 5th Grade	Corporal
6	Seaman and Fireman Second Class	Private 1st Class	Private 1st Class
7	Apprentice Seaman	Private	Private

Ratings in the Navy are divided into branches in accord with the special duties of each—Seaman Branch, Artificer Branch, Artificer Branch (Engine Room), Aviation Branch, Special Branch, Specialists, Commissary Branch, and Steward's Branch. Illustrations of specialty devices for many of these ratings will be found on pages xvi and xvii.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Seaman Branch			
Boatswain's Mate	BM	3-1	Work with canvas and hoisting with block and tackle. Handle rope, wire, and anchor chain. Handle power and sail boats. Steer ship and chart courses. Direct salvage.
Boatswain's Mate A	BMA	3-1	The above and in addition, Master-at-arms.
Coxswain	Cox	4	Work with canvas and handle boats. Know signaling.
Turret Captain	TC	2-1	Take charge of gun turret and crew. Assemble and repair guns. Handle ammunition. Operate periscopes and range finders.
Gunner's Mate	GM	4-1	Take charge of gun and crew. Assemble and fire all types of guns. Handle ammunition. Handle mines and depth charges.
Torpedoman's Mate	TM	4-1	Lubricate, assemble, charge and fire torpedoes. Lay mines and drop depth charges.
Torpedoman's Mate E	TME	4-1	Torpedoman's mate, electrical.
Quartermaster	QM	4-1	Steer ship and take soundings. Use range finder. Plot bearings. Know signal control and navigation. Send and receive International Code by blinker, searchlight and semaphore.
Signalman	SM	4-1	Stand signal watch on bridge. Identify flags. Use blinker, searchlight and semaphore. Use range finder, searchlights, signal apparatus.
Fire Controlman	FC	4-1	Stow, inspect and repair fire control instruments. Take charge of fire control equipment. Know electricity—A.C. and D.C. Man fire control stations.
Fire Controlman R	FCR	4-1	In addition to above, range finder operator.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Fire Controlman S	FCS	4-1	Submarine fire controlman.
Mineman	MN	4-1	Carry and move mine cases, anchors, cables, lines, buoys.
Seaman	S	6-5	Know naval drill duties, knots, steering and signaling. Stand watch and gunnery duties.
Apprentice Seaman	AS	7	Know naval drill duties, tie knots. Stand watch.
Artificer Branch	(Left arm rating device)		
Radioman	RM	4-1	Transmit and receive radio messages. Encipher and decipher messages.
Radio Technician	RT	4-1	Maintain radio equipment.
Radarman	RdM	4-1	Stand radar watch and operate radar equipment.
Carpenter's Mate	CM	4-1	Use hand and power tools. Take charge of ship ventilation, painting, watertight control, drainage. Understand shoring and drydocking.
Shipfitter	SF	4-1	Use hand and machine tools for steel metal work. Bend, repair and fit pipes. Operate fire extinguishers and rescue breathing apparatus.
Metalsmith	M	4-1	Make plans, time and cost estimates. Work in copper and brass. Temper metals, repair damage. Test for watertightness.
Molders	ML	4-1	Equip and work in foundry. Make castings. Use molding tools. Operate oil furnaces.
Patternmaker	PM	4-1	Use pattern and molding tools. Execute intricate patterns.
Sonarman	SoM	4-1	Operate special sound equipment.
Sonarman H	SoMH	4-1	Operate special harbor sound equipment.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Painter	Ptr	4-1	Prepare and apply paints and varnishes. Lay and repair tiling and linoleum. Take charge of and repair fire extinguisher and rescue breathing apparatus.
Telegrapher	T	4-1	Send and receive cables.
Special Artificer O	SAO	4-1	Repair all optical instruments, such as telescopes, periscopes, compasses, range finders.
Special Artificer I	SAI	4-1	Repair typewriters and watches. Coat lenses of optical instruments.
Special Artificer D	SAD	4-1	Knowledge and repair of special training devices.
Artificer Branch (Engine Room)			
Machinst's Mate	MM	4-1	Operate main and auxiliary engines. Adjust, repair, and overhaul engines. Be familiar with ship's drainage systems, distilling plants, evaporators and pumps.
Machinist's Mate E	MME	4-1	Engineman.
Machinist's Mate G	MMG	4-1	Industrial gas generating mechanic.
Machinist's Mate R	MMR	4-1	Refrigeration mechanic.
Machinist's Mate S	MMS	4-1	Shop machinist.
Motor Machinist's Mate	MoMM	4-1	Operate machine tools. Operate and maintain internal combustion engines and engine auxiliaries. Knowledge of pressure and air systems. Be familiar with electrical apparatus.
Electrician's Mate	EM	4-1	Use electrical tools and repair electrical equipment. Charge storage batteries. Wind armatures. Stand watch on main gyrocompass and in main control room of electrically driven ships. Repair telephone circuits. Apply first aid in case of electric shock.
Water Tender	WT	4-1	Take charge of fireroom when under way. Maintain, repair, and overhaul boiler system.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Boilermaker	B	4-1	Fit pipes, make repairs in boilers. Know construction of marine boilers and fireroom safety precautions.
Fireman	F	6-5	Fire and tend boilers. Operate, adjust and repair pumps.
Aviation Branch			
Aviation Pilot	AP	3-1	Pilot planes and airships. Serve as plane captain.
Torpedoman's Mate V	TMV	4-1	Torpedoman's mate assigned to aviation activities.
Aviation Machinist's Mate	AMM	4-1	Assemble, service and repair airplanes and airplane engines. Splice aircraft wiring. Know principles and theory of flying.
Aviation Machinist's Mate C	AMMC	4-1	Aviation carburetor mechanic.
Aviation Machinist's Mate F	AMMF	4-1	Aviation flight engineer.
Aviation Machinist's Mate H	AMMH	4-1	Aviation hydraulic mechanic.
Aviation Machinist's Mate I	AMMI	4-1	Aviation instrument mechanic.
Aviation Machinist's Mate P	AMMP	4-1	Aviation propeller mechanic.
Aviation Electrician's Mate	AEM	4-1	Inspect, maintain, repair and install all electrical equipment in aircraft.
Aviation Radioman	ARM	4-1	Operate radio transmitting and receiving equipment of naval aircraft.
Aviation Radio Technician	ART	4-1	Maintain all aviation radio equipment.
Aviation Metalsmith	AM	4-1	Repair airplane metal parts. Know principles and theory of flying.
Aviation Ordnanceman	AOM	4-1	Handle and take care of all aviation weapons.
Aviation Ordnanceman B	AOMB	4-1	Aviation bombsight mechanic.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Aviation Ordnanceman T	AOMT	4-1	Aviation turret mechanic.
Parachute Rigger	PR	4-1	Pack and repair parachutes. Parachute jumping experience.
Aerographer's Mate	AerM	4-1	Make weather observations. Read weather codes and signals.
Photographer's Mate	PhoM	4-1	Organize and direct operations of Naval photographic unit. Operate motion picture machines. Develop negatives and make prints.
Airship Rigger	AR	4-1	Control and moor airships. Know steering and meteorology.
Painter V	PtrV	4-1	Aircraft painter.
Storekeeper V	SKV	4-1	Aviation storekeeper.
Special Branch			
Yeoman	Y	4-1	Take charge of ship's office. Take dictation, write Navy letters. Prepare reports and keep personnel records.
Storekeeper	SK	4-1	Take charge of ship's storeroom. Issue and account for stock and clothing.
Storekeeper D	SKD	4-1	Disbursing storekeeper.
Storekeeper T	SKT	4-1	Handle technical stock material.
Pharmacist's Mate	PhM	4-1	Take charge of sick bay. Do minor surgery and administer simple medicines.
Hospital Apprentice	HA	6-5	Know minor surgery, first aid and nursing. Maintain sanitary conditions.
Musician	Mus	4-1	Play standard band music. Read music at sight.
Buglemaster	Bgmstr	4-1	Know all bugle and drum calls and honors rendered. Lead and instruct a corps.
Bugler	Bug	6-5	Play in a bugle and drum corps. Know bugle calls and honors.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Printer	Prtr	4-1	Take charge of ship's printshop, set type. Read proof.
Printer L	PrtrL	4-1	Lithographer.
Printer M	PrtrM	4-1	Multilith operator.
Ship's Service Man B	SSMB	4-1	Barber.
Ship's Service Man C	SSMC	4-1	Cobbler.
Ship's Service Man L	SSML	4-1	Laundryman.
Ship's Service Man T	SSMT	4-1	Tailor.
Specialists			
Specialist A	Sp(A)	4-1	Athletic instructor.
Specialist C	Sp(C)	4-1	Classification interviewer.
Specialist F	Sp(F)	4-1	Fire fighter.
Specialist G	Sp(G)	4-1	Aviation free gunnery instructor.
Specialist I	Sp(I)	4-1	Punched card accounting machine operator and mechanic.
Specialist M	Sp(M)	4-1	Mail clerk.
Specialist O	Sp(O)	4-1	Inspector of Naval material.
Specialist P	Sp(P)	4-1	Photographic specialist.
Specialist P(PG)	Sp(P) (PG)	4-1	Photogrammetry.
Specialist P(LB)	Sp(P) (LB)	4-1	Laboratory.
Specialist P(VM)	Sp(P) (VM)	4-1	V-mail.
Specialist P(MP)	Sp(P) (MP)	4-1	Motion picture production.
Specialist Q	Sp(Q)	4-1	Communication specialist.
Specialist Q (CR)	Sp(Q) (CR)	4-1	Cryptographer.
Specialist Q (TE)	Sp(Q) (TE)	4-1	Technicians.
Specialist Q (IN)	Sp(Q) (IN)	4-1	Radio Intelligence.
Specialist R	Sp(R)	4-1	Recruiter.

Rating	*Abbreviation*	*Pay Grades*	*Duties*
Specialist S	Sp(S)	4-1	Shore patrol; Master-at-arms.
Specialist T	Sp(T)	4-1	Teacher.
Specialist T (LT)	Sp(T) (LT)	4-1	Link Trainer Instructor.
Specialist U	Sp(U)	4-1	Supervisor of WAVE quarters.
Specialist V	Sp(V)	4-1	Transport airman.
Specialist W	Sp(W)	4-1	Chaplain's assistant.
Specialist X	Sp(X)	4-1	Specialists not elsewhere classified.
Specialist X(ED)	Sp(X)(ED)	4-1	Engineering draftsmen.
Specialist X(TD)	Sp(X)(TD)	4-1	Topographical draftsmen.
Specialist X(CT)	Sp(X)(CT)	4-1	Cartographers.
Specialist X(PL)	Sp(X)(PL)	4-1	Plastic experts.
Specialist X(TS)	Sp(X)(TS)	4-1	Air stations operations desk (time shack).
Specialist X(QM)	Sp(X)(QM)	4-1	Operation—plotting and chart work.
Specialist X(PI)	Sp(X)(PI)	4-1	Pigeon trainers.
Specialist X(SB)	Sp(X)(SB)	4-1	Telephone switchboard operator supervisors.
Specialist X(VA)	Sp(X)(VA)	4-1	Visual training aids.
Specialist Y	Sp(Y)	4-1	Control tower operator.
Commissary Branch			
Chief Commissary Steward	CCS	1A-1	Supervise ship's galley.
Ship's Cook	SC	4-2	Supervise and prepare cooking.
Ship's Cook B	SCB	4-2	Butcher.
Baker	Bkr	4-2	Operate ovens. Do any kind of baking.
Steward's Branch			
Steward	St	4-1	Take charge of mess arrangements.
Cook	Ck	4-1	Take charge of galley.
Steward's Mate	StM	7-5	Serve at table in officers' mess.

CHAPTER 11

Security of Information

THE IMPORTANCE OF SECURITY

On the day you entered the Navy you began to learn things that our enemy would like to know. Every day you remain in the Navy you will be entrusted with more and more information. The more you know the more our enemies may learn from you if you are careless. Every scrap of restricted information is valuable to the enemy, no matter how unimportant it seems to you. A few thoughtless words may supply the missing item the enemy needs to complete his knowledge. The cost of loose talk is paid in the lives of your shipmates. Don't be the one who throws these lives away. The best and simplest rule is not to discuss restricted information at all with anyone.

HOW AND WHY SECURITY IS BROKEN

Conceit and boasting.—These are partners in the commonest cause of breaking security. Conceit may be harmless enough until it leads us to boast. What makes us start to blow our own horn? Even the most modest of us will boast to impress a woman. This is of no official concern to the Navy as long as we stick to strictly non-military subjects and don't begin boasting of the things we know about the Navy.

You may be on secret duties. You may know what is in the wind for future operations or the departure date of a convoy. You may even know the names of the ships. Whatever you know, don't discuss it or boast about knowing it. Boast about your dancing, your kid brother, or your big feet, but forget that you have any inside information about the Navy. A secret is as good as lost if you even hint at its existence. The more you know, the more you may be tempted, especially if others are boasting about how much they know.

Boasting is contagious. If you boast to your girl to impress her, she will boast to her friends about what an important fellow you are. A boaster will spill more and more information if his audience either pretends not to believe him or seems to be lost in admiration of his knowledge. The boaster is so pleased with himself that he keeps right on talking. A popular girl is a good listener; so is a spy.

Don't trust anyone.—Trust no one with information about the Navy; it's not yours to give away. It's not your right to decide who can be trusted. We forget that an enemy agent has the choice of being successful or facing the firing squad. A good spy, male or female, looks like a good American, with an honest face and an easy line of chatter about hot dogs, the Brooklyn Dodgers, and Washington's Birthday.

This has nothing to do with your confidence and trust in your family and friends. It simply means that you must *not* share with them secrets that are not yours to share, secrets that belong to the Navy. The point is that even the most trustworthy of those that are close to you may give away information without knowing it. Bitter experience shows us that the more people who know the name of your ship and the date it will sail, the less chance you have of making port.

Enthusiasm.—Your interest in the progress of the Navy and in your own job is natural and desirable, but it must be carefully controlled to avoid revealing information valuable to the enemy. A clever person will try to get information from you by belittling the importance of your work, or by pretending not to believe your statements. If an argument starts, you may get excited and blurt out facts and figures in your enthusiasm to prove your point. Such a situation may develop from a discussion of some newspaper article or radio broadcast. Never add to a newspaper account, no matter how anxious you may be to show that you know the whole story. Never correct the stories published by newspapers or even the radio, even if you know them to be false. Your corrections may supply just the information the enemy is most anxious to get. Be enthusiastic, but be proud of how much you are helping the Navy by knowing when to keep your mouth shut.

Ignorance of enemy methods.—Ignorance of how the enemy collects information causes serious breaks of security. Our enemies collect thousands of isolated bits of knowledge from all over the world and piece them together to their advantage and our loss. We forget that one scrap of careless conversation picked up by one enemy agent in the corner taproom may assume great importance when added to other scraps collected by other agents. Play safe; don't talk at all.

RESTRICTED TOPICS

The bluejacket who gives away Naval information is hitting his country below the belt and is no hero to anyone except our enemies. No matter how good his record is or how much damage he inflicts on the enemy in battle, he is still of no value if he causes more loss to us by careless talk.

It is a serious offense to commit a breach of security; it is also an offense to conceal a breach of security. If you know of an information leak, notify your superiors at once. Surprise is a vital factor in war. It is important that we should know if the enemy finds out our plans. Always be on the alert to discover and report security breaches. Keep your eyes and ears open and your mouth shut. Get your shipmates to do the same.

Don't talk about: *Location, numbers or movement of Naval personnel or troops.*—Except for personnel in basic or general training and on police duties, don't discuss any troop movements or concentrations or any special training. Keep quiet about the special subjects you are learning in service school or advanced training.

Ships and cargoes.—The enemy is particularly anxious to know about types, quantities and destinations of cargo. The enemy is also vitally interested in any information about transports, convoys, harbor defense, mine fields, new ship construction and launchings, shipyard operations.

Sinkings or damage.—Until they are officially announced and published, play safe and let your friends read about our losses in the newspapers.

Aircraft and air operations.—The enemy is on the alert for any and all information about aircraft types, new designs, production, armament, performance; also for movements of men or material by air.

Fortifications and antiaircraft defenses.—The location, size and strength of installations and the location or camouflage of shelters, supply dumps or other possible enemy targets is valuable knowledge. A good rule is not to talk about what goes on inside any area where you have to show your identification card at the gate.

Weapons and equipment.—Don't discuss technical data, except when such information has been published openly. If the Japs had found out about our PT boats sooner, they would have saved themselves a lot of losses. One subject that is particularly taboo is radar; just pretend you never heard of it.

Last, but not least, *don't repeat scuttlebutt* about military subjects. Challenge all rumors and harmful stories about our allies, our inefficiencies or mistakes, the enemy's strength, race dissension or breaches of discipline. Keep scuttlebutt to yourself and tell your shipmates to do the same.

CLASSIFIED MATTER

Any information or material which must be circulated among Naval and military personnel, but which must also be safeguarded against leakage to the enemy, is classified and marked in one of three ways. The classification of documents determines how many people will see them.

Secret.—Secret matter is the most closely guarded and is considered to be of such importance that its disclosure might endanger the national security. One subdivision of secret is Top Secret. Documents so classified are seen by very few people indeed. Any knowledge of secret matter which comes to you outside of assigned duties should be reported to your superiors immediately.

Confidential.—Confidential matter is second in importance and is of such a nature that disclosure would be harmful to the interests or prestige of the Nation. Confidential material is never left unguarded. Report any breaks in the security of confidential matter.

Restricted.—This is the lowest classification. Restricted matter is limited in circulation to government or military personnel who are properly concerned with the information. Often matter which would normally be classified as *confidential* is classified *restricted* because the wider circulation is of more benefit than the additional security.

CENSORSHIP

To safeguard security of information the Navy inspects mail going to and from its ships and outlying stations. All private correspondence is subject to censorship regulations and must be placed unsealed in letter boxes or post offices run by the Navy. Censorship rules are the outgrowth of bitter experience. Information of great value reaches the enemy because of carelessness or lack of judgment in writing letters. Not only information itself, but clues to information have been found exceedingly dangerous.

The censor knows that what a man writes to his family or friends is his own concern, and he forgets about your letter ten seconds after he reads it. He doesn't know you, your friends or your family. He is not interested in your affairs and is not snooping into your private life. However, he has been taught to be security-minded, and he won't let anything get through that might endanger ships or lives. The Navy doesn't believe that its men are intentionally careless in permitting information to leak out, but it must take every precaution against such leakage. This is necessary because men writing letters may not always know when they are revealing information. The censor does know, and it is his responsibility to see that no information vital to the Navy is transmitted.

Every man writing a letter home wants it to be interesting. He wants to tell his family and friends about exciting events. Only a few want to be big shots or braggarts. A Navy man may find it tough to write a letter, particularly if every time he writes a word he wonders if it will result in his getting a deck or summary court-martial.

Every man has at least one good friend whom "there should be no harm in telling" everything he knows. Friends and relatives are not spies or enemy agents, but they are frequently careless because they have not been shown the importance of security. That is where censorship steps in as an unpleasant but necessary protective measure.

Don't write letters aboard ship and carry them ashore for mailing.

Don't give letters and messages to your friends to mail ashore or to take home for you.

Don't send postcards showing the location of your ship or its destination.

Don't try to send pictures of Naval or military scenes or equipment—show them to the censor.

Don't describe ship movements—ours or those of other nations.

Don't write about casualties—personnel or ship.

Don't use codes or symbols with a special meaning. Ciphers and codes are prohibited by Regulation 9(A) of Navy Censorship Regulations.

Don't sink your own ship by breaking censorship regulations.

Don't write anything in a letter that you aren't prepared to say to a Jap or German.

WHAT TO DO IF TAKEN PRISONER

Your security-mindedness will be put to the greatest test if you are unlucky enough to be captured. There is one rule to remember, and only one. *Give your name, rate and serial number—nothing else.* Think about this rule, learn it, and repeat to yourself what you are going to say. Under the international rules of war, there is absolutely no other information you are required to give. Just as soon as you give your ship, your company, your destination, or any other information, you are asking for trouble and helping the enemy to accomplish the death or capture of your shipmates.

If you know you are going to be captured, be sure that you get rid of any military information you may have with you. Hang on to your dog tag, your I.D. card and your money. Get rid of everything else, including pictures, letters and notes.

The enemy will try many ways to get information from you. He has clever men specially trained in the art of getting prisoners to talk. You can't outsmart them; don't try it. Don't try to lie or give false information, and don't try to decide what information is harmless. Remember that the enemy is questioning other prisoners and will put the parts of the puzzle together.

Many methods may be used to get you to talk. The enemy may act friendly and play on your feelings or be sympathetic about some minor personal grudge you may have. Fake prisoners may be planted among you; listening devices may be used. Special favors or rations may be offered to soften you up. Always keep in mind what the enemy is trying to do and don't be fooled. Remember too that, once you have given information, the enemy will lose interest in you and treat you no better than anyone else.

Occupy yourself by thinking about the possibility of escape and study the chances. Accumulate and remember any and all information about the enemy and try to learn his language. If you manage to escape anything you have learned will help the Navy.

Above all, *be* smart; don't *talk* smart. Keep your eyes and ears open and your mouth shut. Give your name, rate and serial number and then keep quiet.

PART 2

MILITARY DRILL AND MOVEMENTS ON LAND

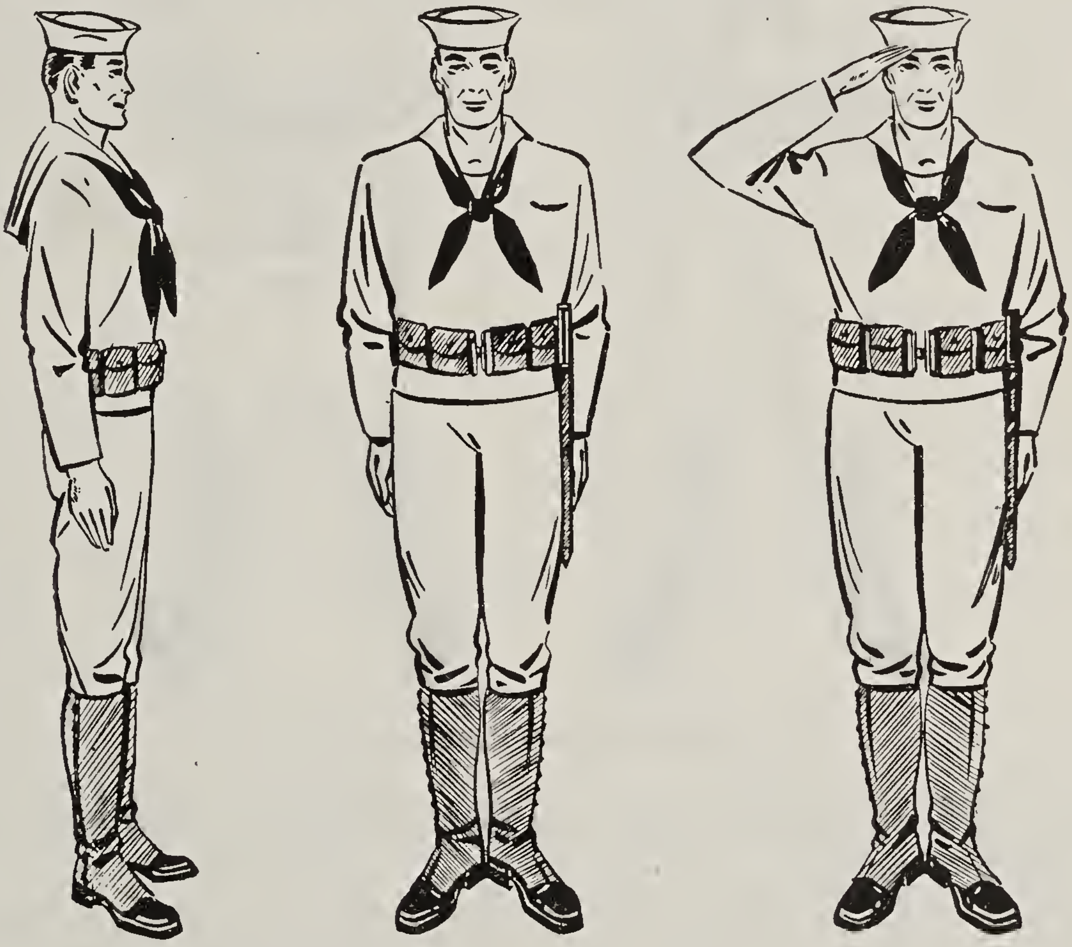
CHAPTER 12

School of the Recruit

The purpose of military drill is three-fold: to teach recruits the fundamentals of military bearing; to gain experience in giving and following commands; and to prepare for military operations on land.

THE POSITIONS

Position of attention.—Heels on the same line, close together, feet turned out to form an angle of 45 degrees, knees straight, hips level, body erect, with the weight resting equally on the heels and balls of the feet. Shoulders squared, chest arched, arms hanging down without stiffness, so that thumbs are along the seams of the trousers,



Position of attention. Hand salute.

FIGURE 12-1

palms and fingers relaxed. Head erect, chin drawn in, and eyes straight to the front. In coming to attention the heels are brought together smartly.

The rests.—Commands: *FALL OUT; REST; AT EASE;* and 1. *Parade,* 2. *REST.*

FALL OUT. Men break ranks but remain nearby. Men return to places and come to attention at the command *FALL IN.*

REST. Right foot is kept in place. The individual may talk and move about.

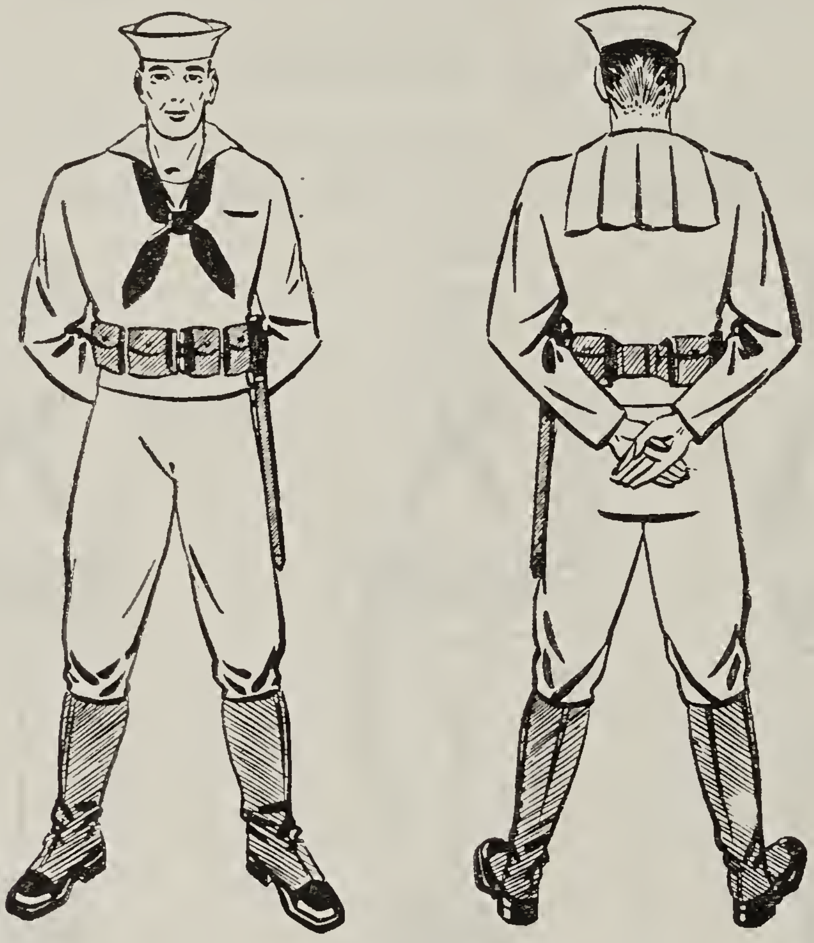


Figure 12-2.—Parade rest.

AT EASE. Right foot is kept in place. The individual keeps silent but may move about.

PARADE REST. Move the left foot smartly 12 inches from the right foot; at the same time, clasp the hands behind the back, palms to the rear, the right hand clasping the left thumb, arms hanging naturally. The individual keeps silent and motionless, except that the head and eyes may be turned to the instructor or unit commander.

Being at any rests other than *FALL OUT,* to resume attention the command is: 1. *Squad,* 2. *ATTENTION.*

Eyes right (left).—Command: 1. *Eyes,* 2. *RIGHT* (*LEFT*). At the command, each man turns his head to the right, except the guide and, when in line, the man on the right in the rear rank and the man on the right in the line of file closers.

At the command *FRONT*, turn head and eyes to the front.

When marching, the command *Eyes* is given as the left foot strikes the ground; the command *RIGHT* when the left foot strikes the ground the next time.

THE SALUTE

Hand salute.—Command: 1. *Hand,* 2. *SALUTE,* 3. *TWO.* The command *TWO* is used only when saluting by the numbers. At the command *SALUTE,* raise the right hand smartly so that the tip of the forefinger touches the lower part of the hat above and to the right of the right eye, thumb and fingers extended and joined, upper arm horizontal, forearm inclined at about 45 degrees, hand and wrist straight. Face the person saluted and look him directly in the eye.

At the command *TWO,* drop the arm to its normal position by the side in one movement, and turn the head and eyes to the front. In passing in review execute the hand salute in the same way. The salute is held until six paces beyond the person saluted.

FACINGS

All facings are executed in the cadence of quick time.

To the flank.—Command: 1. *Right* (*left*), 2. *FACE.* At the command *FACE,* slightly raise the left heel and right toe; face to the right, turning on the right heel, putting pressure on the ball of the left foot. Hold the left leg straight. Then place the left foot smartly beside the right.

To the oblique.—Command: 1. *Right* (*left*) *half,* 2. *FACE.* Execute half face as prescribed above, turning only 45 degrees.

To the rear.—Command: 1. *About,* 2. *FACE.* At the command, place the toe of the right foot about a half foot length to the rear and slightly to the left of the left heel without moving the left foot. Put the weight of the body mainly on the heel of the left foot, right leg straight. Then turn to the rear, moving to the right on the left heel and on the ball of the right foot. Place the right heel beside the left to complete the movement.

STEPS AND MARCH COMMANDS

All movements executed from the halt, except right step, begin with the left foot. *Forward, half step, halt* and *mark time* may be executed one from the other in quick or double time.

The following table prescribes the length in inches and the cadence in steps per minute of steps in marching.

Step	*Time*	*Length*	*Cadence*
Full	Quick	30	120
Full	Double	36	180
Full	Slow*	30	
Half	Quick	15	120
Half	Double	18	180
Side	Quick	12	120
Back	Quick	15	120

* This is a special step executed only as the funeral escort is approaching the place of interment. The cadence, in accordance with that set by the band, varies in different airs that may be played.

All steps and movements are executed in quick time, unless the unit is marching in double time or double time is added to the command. Example: 1. *Squad right, double time,* 2. *MARCH.*

Quick time.—At halt, to march forward in quick time, the command is: 1. *Forward,* 2. *MARCH.*

At the command *Forward,* shift the weight of the body to the right foot without movement.

At the command *MARCH,* move the left foot forward a full step and plant it without shock. Next, advance and plant the right foot; continue the march. Swing arms about 6 inches to the front and 3 inches to the rear of the body.

Marching in double time, to resume quick time the command is: 1. *Quick time,* 2. *MARCH.* At the command *MARCH,* given as either foot strikes the ground, advance and plant the other foot in double time. Then resume quick time and drop hands to the sides.

Double time.—Command: 1. *Double time,* 2. *MARCH.* Being at halt, on the command *Double time,* shift weight to the right foot. At *MARCH,* raise forearms, fists doubled, knuckles out, to horizontal position along the waistline; take up an easy run with the step and cadence of double time, allowing a natural swinging motion of the arms.

Being in march at quick time, at the command *MARCH,* given as either foot strikes the ground, take one step in quick time and then step off in double time.

To mark time.—Command: 1. *Mark time,* 2. *MARCH.* Being in march, at the command *MARCH,* given as either foot strikes the ground, advance and plant the other foot, bringing the first foot up, and placing it so that both heels are on line; continue the cadence by alternately raising and planting each foot. Feet are raised 2 inches from the ground. Being at halt, at the command *MARCH,* raise and plant first the left and then the right foot, as described above.

Half step.—Command: 1. *Half step,* 2. *MARCH.* At the command, take steps of 15 inches in quick time and 18 inches in double time.

Side step.—At *halt* and at *mark time,* command: 1. *Right (left) step,* 2. *MARCH.* Place the right foot 12 inches to the right, bringing the left foot beside the right, left knee straight. Continue in quick time. The side step is used for short distances only and is not executed in double time.

Back step.—At *halt* or at *mark time,* command: 1. *Backward,* 2. *MARCH.* Take 15-inch steps to the rear. The back step is used for short distances only and is not executed in double time.

To halt.—Command: 1. *Squad,* 2. *HALT.* When marching forward in quick time, backward, or marking time, at the command, given as either foot strikes the ground, plant the other foot as in the movement being executed and place the first foot beside the other.

When marching in double time, at the command *HALT,* given as either foot strikes the ground, plant the other foot as in double time and halt in two counts.

When executing right (left) step, at the command *HALT,* given as the heels are together, complete one more step, coming to halt when the heels are brought together.

FACINGS IN MARCHING

There is no command to face in marching. This movement is done as part of another movement and either at command for the other movement, or after it. Example: No. 1 man of the front rank of the leading squad executes a face to the right in marching at the command: 1. *Column right,* 2. *MARCH,* while other No. 1's execute the movement on reaching the pivot and without command.

To face in marching and advance from a halt.—Turn in the direction ordered on the ball of the right foot, and at the same time step off in the new direction with the left foot keeping in the proper cadence.

To face in marching and mark time from a halt.—Turn in the ordered direction, on the ball of the right foot, and at the same time raise the left foot and place it beside the right foot, marking time.

To face right (left) in marching.—When the turn is to be made on the command of execution, given as the right foot strikes the ground, advance, plant the left foot, turn to the right on the ball of the left foot, and at the same time step off in the new direction in the proper cadence.

To face to the right (left) in marching and mark time.—Execute as above, but when the turn is made on the ball of the left foot, raise the right foot and plant it beside the left as in marking time.

To march by the flank.—Command: 1. *By the right (left) flank,* 2. *MARCH.* When marching, at the command *MARCH,* the movement is executed as given above.

When at halt, at the command *MARCH,* movement is executed as described above.

To the rear.—Command: 1. *To the rear,* 2. *MARCH.* In quick time, at the command *MARCH,* given as the right foot strikes the ground, advance and plant the left foot. Turn 180 degrees to the right on the balls of both feet and immediately step off with the left foot.

In double time, at the command *MARCH,* given as the right foot strikes the ground, turn 180 degrees to the right, taking four steps in place, keeping cadence; then step off with the left foot.

Change step.—Command: 1. *Change step,* 2. *MARCH.* In quick time, at the command *MARCH,* given as the right foot strikes the ground, advance and plant the left foot, place the right toe near the heel of the left foot, and step off with the left foot. Change may also be executed on the right foot, the command *MARCH* being given as the left foot strikes the ground.

In double time, at the command *MARCH,* given as either foot strikes the ground, take one hop on the next foot and continue the march.

CHAPTER 13

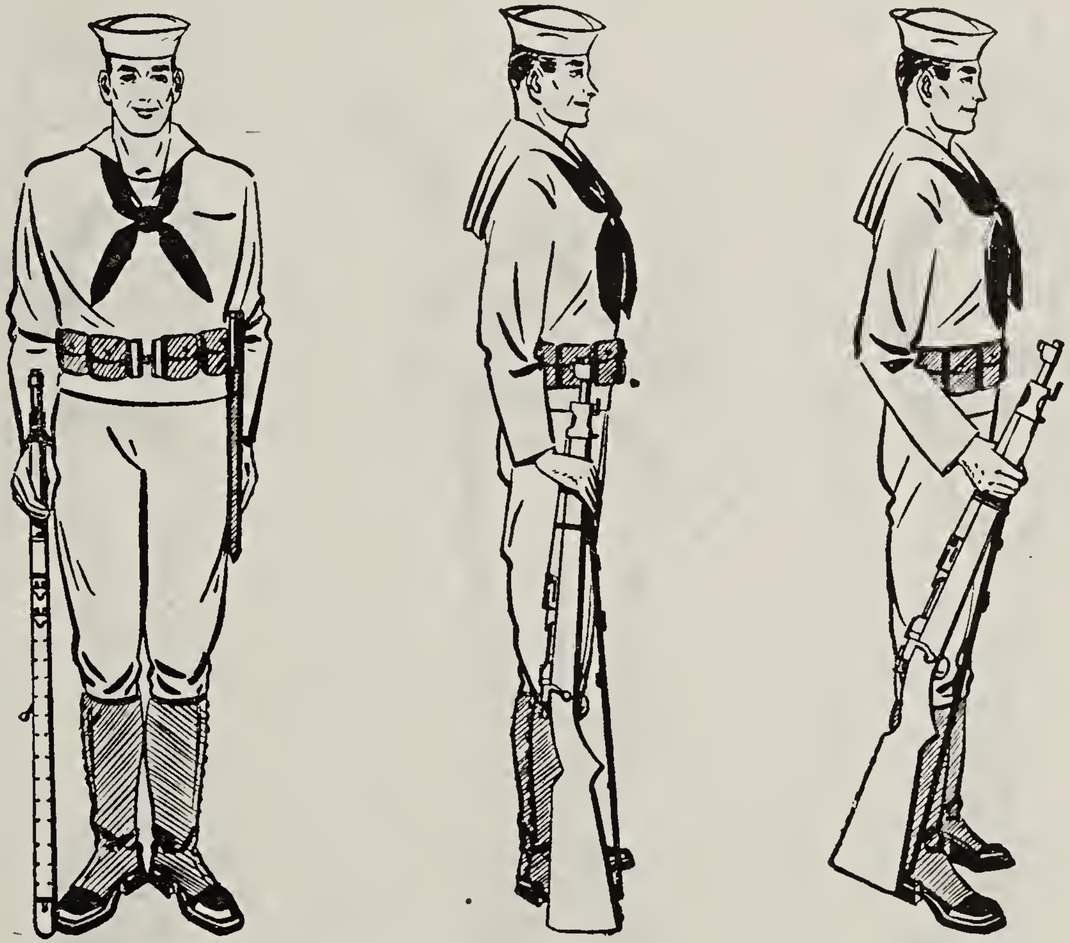
Manual of Arms

Except where otherwise indicated, these rules apply to the U. S. rifle caliber .30, M1903, and to the U. S. rifle caliber .30, M1.

In all positions of the left hand at the balance, the thumb clasps the rifle, and the sling is included in the grasp of the hand. The term "at the balance" refers to the points on the rifle as follows:

1. U. S. rifle caliber .30, M1903.—Center of the rear sight leaf.
2. U. S. rifle caliber .30, M1.—Just forward of the trigger housing.

In all positions of the rifle across the body, the barrel is up, butt in front of the right hip, barrel crossing opposite the junction of the neck with the left shoulder. The rifle is grasped at the barrel with the



Position of *Order Arms*.

Position of *Trail Arms*.

Figure 13-1

left hand, palm toward body, wrist straight, fingers together. All movements are executed in quick time.

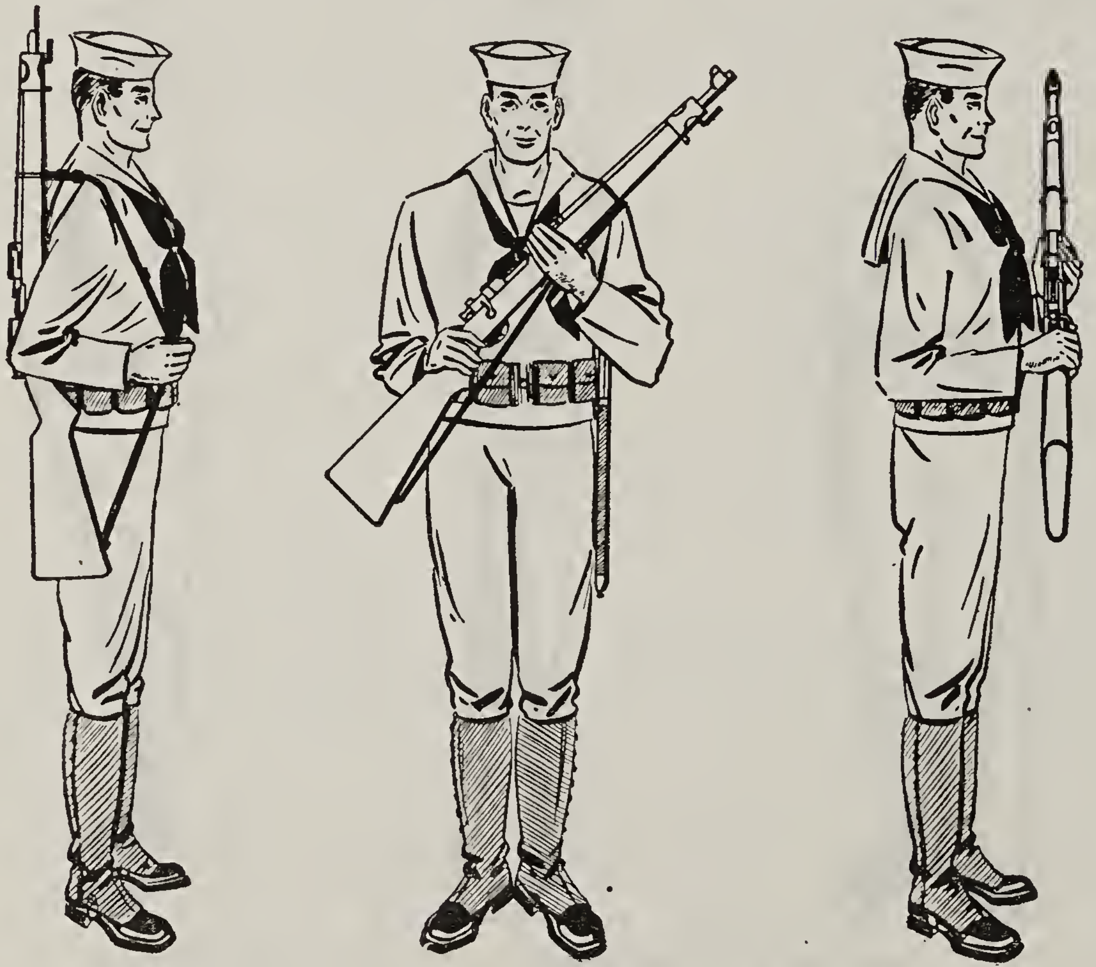
The manual is not executed in marching, except to pass from right shoulder to left shoulder or port arms, and the reverse in marching at attention. These movements may be used to add interest or to prevent fatigue.

The manual is taught at a halt, and the movements may be divided into motions and executed in detail. In this case the command of execution determines the prompt execution of the first motion, and the commands TWO, THREE, FOUR that of the other motions.

Any appropriate position of the manual of arms may be ordered from a previous position by giving a proper command.

For exceptional conditions the rifle may be carried as directed.

Position of order arms.—The butt of the rifle rests on the ground, barrel to the rear, toe of the butt on line with the toe of, and touching the right shoe, the right hand holding the rifle between the thumb and fingers, left hand in position of attention without arms.



Position of *Sling Arms.*

Position of *Port Arms.*

Figure 13-2

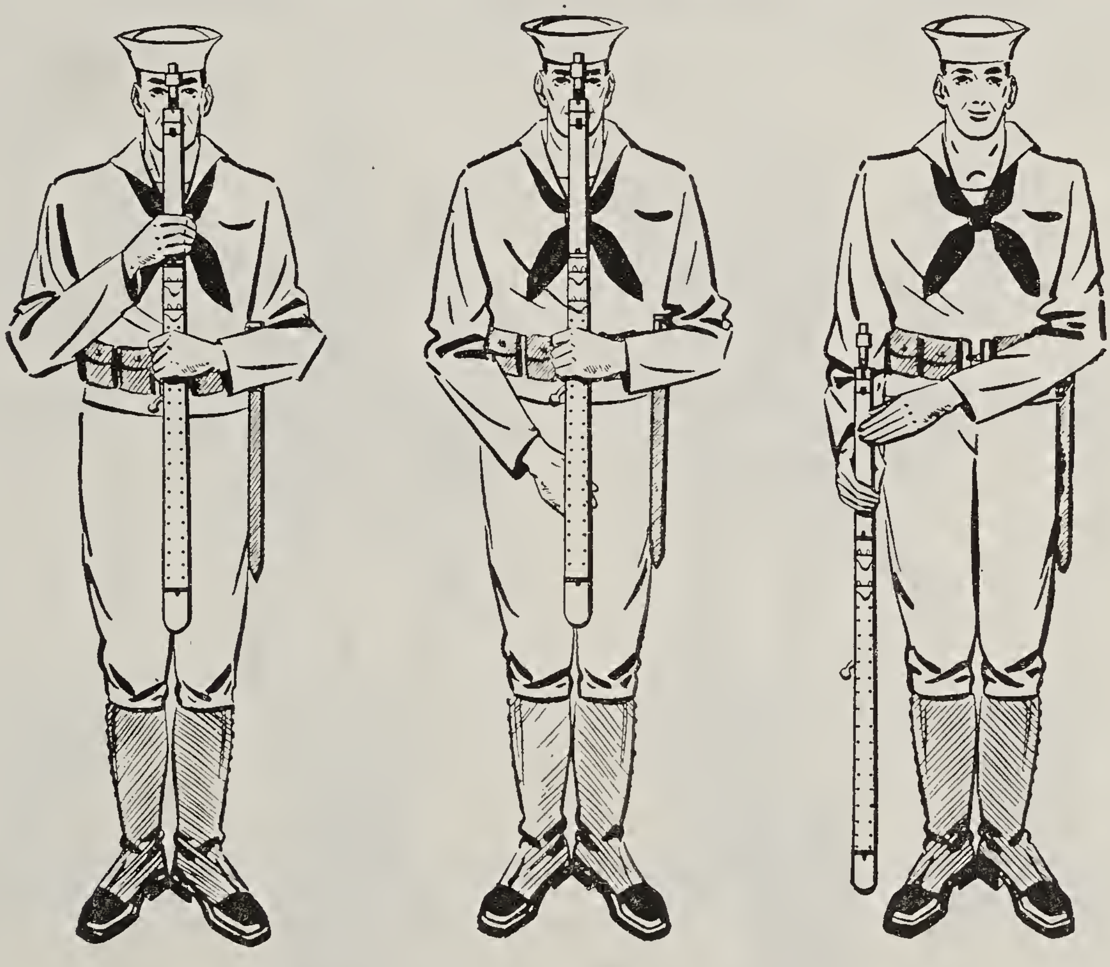
Being at order arms.—1. *Trail,* 2. *ARMS.* At the command, raise the rifle and move the muzzle forward so that the barrel makes an angle of about 15 degrees with the vertical, right arm slightly bent.

Being at trail.—1. *Order,* 2. *ARMS.* At the command, lower the rifle with the right hand and resume the position of *Order Arms.*

Being at order, to sling arms, and being at sling, to unsling.—*SLING ARMS.* This movement is not done in cadence and applies to any rifle, automatic rifle or light machine gun. Loosen the sling and assume the position shown in the illustration. This position is used for long parades, reviews, or occasions when prolonged holding of the rifle is too tiring.

UNSLING ARMS. At the command pieces are unslung.

Being at order arms.—1. *Port,* 2. *ARMS.* At the command, raise the rifle with the right hand, carry it across the body until the right hand is in front of and slightly to the left of the chin, barrel up, butt in front of the right hip, barrel crossing opposite the junction of the



Execution of *Present Arms.*

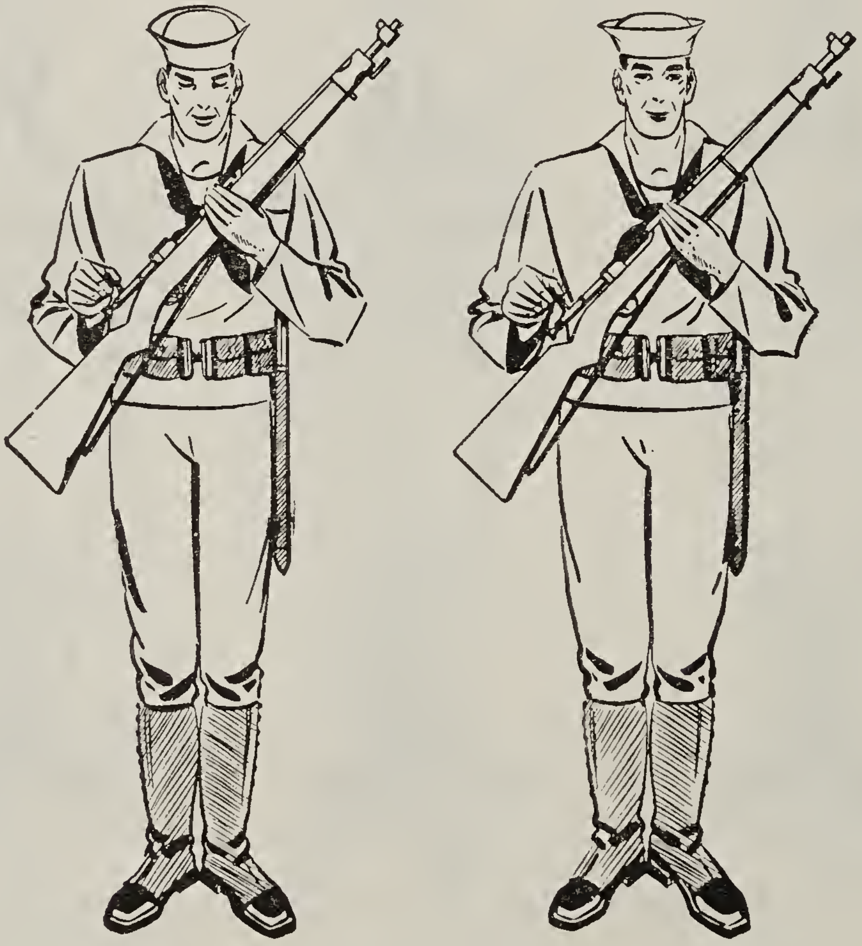
Next to last position of *Order Arms.*

FIGURE 13-3

neck with the left shoulder. At the same time, grasp the rifle at the balance with the left hand, palm toward body, wrist straight. (*TWO*) Move the right hand to the small of the stock, grasping it palm down, holding right forearm horizontal, left elbow against the body.

Being at order arms.—1. *Present,* 2. *ARMS.* At the command, move the rifle with the right hand in front of the center of the body, barrel vertical and to the rear. Grasp the rifle with the left hand at the balance, forearm horizontal, and resting against the body. (*TWO*) Grasp the small of the stock with the right hand.

Being at present or port arms.—1. *Order,* 2. *ARMS.* At the command, let go of the rifle with the right hand, and grasp it again between the upper sling swivel and stacking swivel. (*TWO*) Drop left hand and lower the piece to the right so that the butt is 3 inches from the ground, barrel to the rear, left hand with fingers extended and joined steadying the rifle, forearms and wrist straight and inclining downward. (*THREE*) Complete the order by lowering the rifle gently to the ground with the right hand. Cut away the left hand smartly to the side. Do not drop the rifle, or strike the butt against the ground.



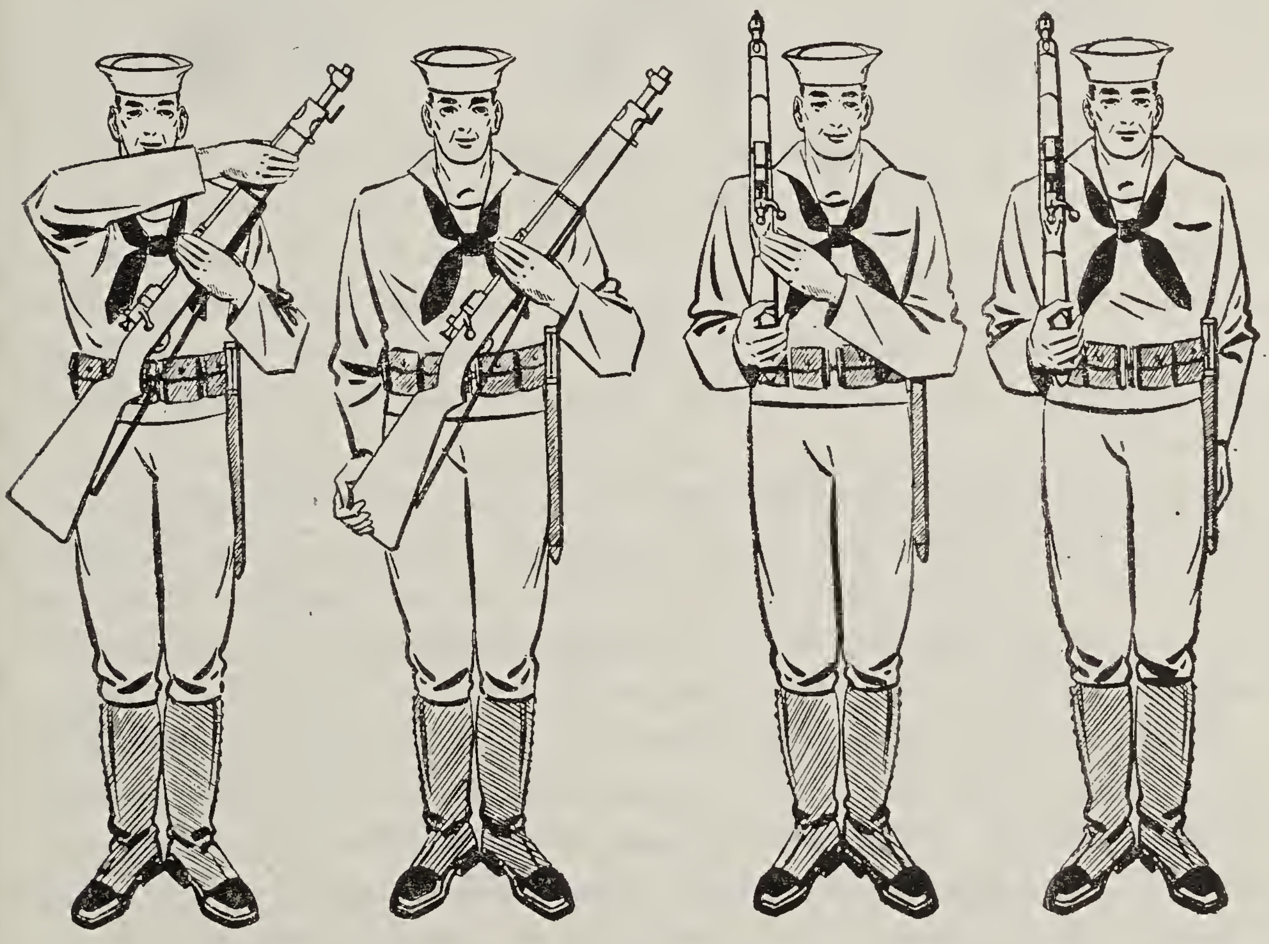
Inspection Arms.

Figure 13-4

Being at order arms.—(a) U. S. rifle caliber .30, M1903. 1. *Inspection,* 2. *ARMS.* At the command, take the position of port arms. Seize the bolt handle with the thumb and forefingers of the right hand. Turn the handle up and draw the bolt back; drop eyes sufficiently to glance into the magazine. Having found the magazine empty, or having emptied it, raise the head and eyes to the front.

(b) U. S. rifle caliber .30, M1. 1. *Inspection,* 2. *ARMS.* At the command, take the position of port arms. With the fingers of the left hand closed, place the left thumb on the operating rod handle and push it smartly to the rear until it is caught, at the same time drop the eyes sufficiently to glance into the receiver. Finding it empty, or having emptied it, raise the head and eyes to the front. At the same time regrasp the piece with the left hand at the balance.

Being at inspection arms.—(a) U. S. rifle caliber .30, M1903. 1. *Order* (*Right shoulder, Port*), 2. *ARMS.* At the preparatory command, push the bolt forward, turn the handle down, pull the trigger



Execution of *Right Shoulder Arms* in 4 movements.

FIGURE 13-5

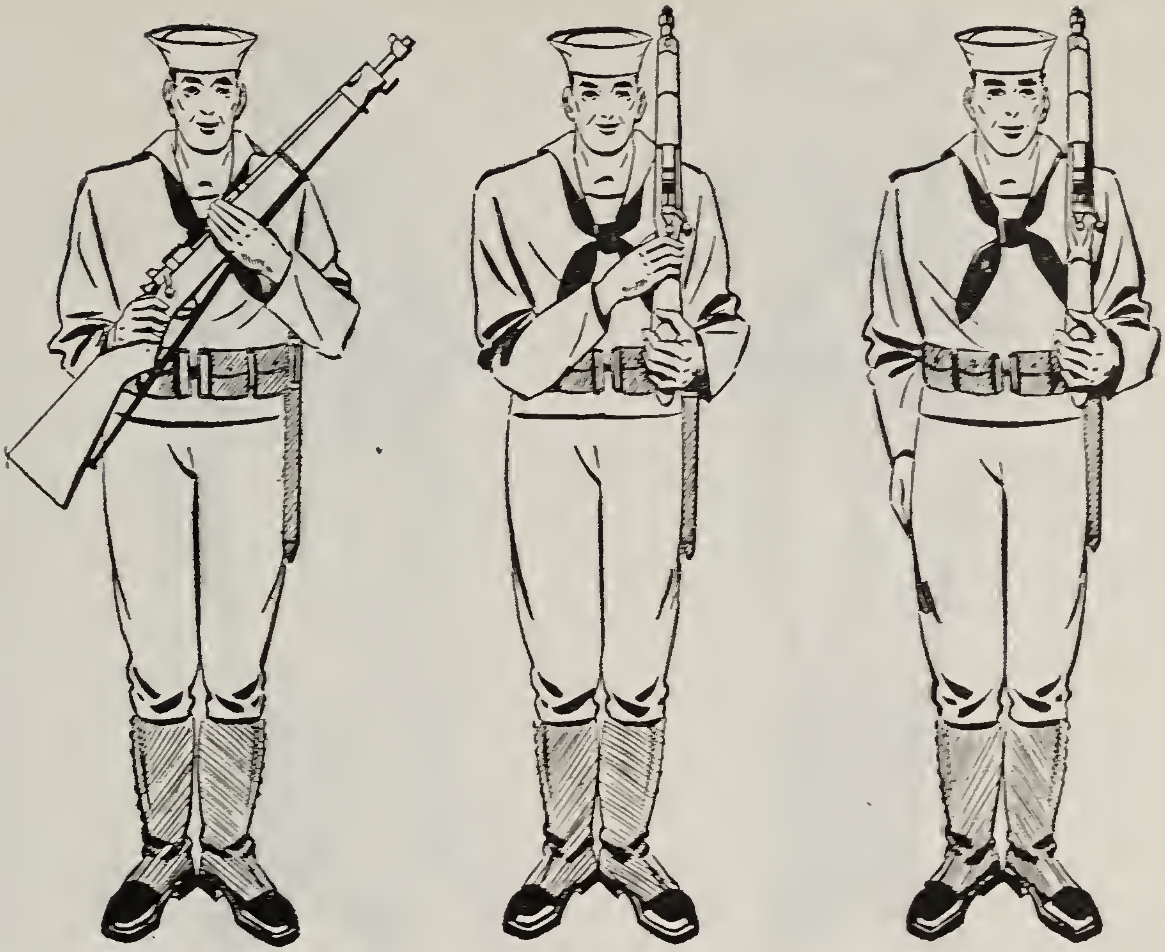
and resume port arms. At the command *ARMS* complete the movement ordered.

(b) U. S. rifle caliber .30, M1. 1. *Lock piece*, 2. *Order* (*Right Shoulder*), 3. *ARMS*, or 1. *Unlock piece*, 2. *DISMISSED.* At the command, place the right side of right hand against the operating rod handle, fingers extended and joined and thumb on the follower. (*TWO*) Force operating rod handle to the rear position, draw on the follower with the right thumb, and permit the bolt to ride forward about one inch over the follower. (*THREE*) Remove the thumb from the follower, and release the operating rod handle. (*FOUR*) Lock, or unlock, the piece and pull trigger as the case may be, resuming the position of port arms. After the pieces have been locked or unlocked as prescribed above, *Order* or *Right Shoulder ARMS* is given or the unit is dismissed.

Being at order arms.—1. *Right shoulder*, 2. *ARMS.* At the command, carry the rifle diagonally across the body with the right hand. At the same time, grasp it at the balance with the left hand. (*TWO*) Regrasp it with the right hand on the butt, heel between the first two fingers, thumb and fingers closed on the stock. (*THREE*) Without changing the grasp of the right hand, place the rifle on the right shoulder, barrel inclined at an angle of about 45 degrees, trigger guard in hollow of the shoulder, right elbow against the side, forearm horizontal. Carry the left hand, thumb and fingers extended and joined, to the small of the stock, first joint of the forefinger touching the cocking piece (for the M1 rifle, the rear end of the receiver), wrist straight, elbow down. (*FOUR*) Cut away the left hand smartly to the side.

Being at right shoulder arms.—1. *Port*, 2. *ARMS.* At the command, press the butt down quickly, throw the rifle across the body, at the same time turning it to the left so as to bring the barrel up, the right hand holding on to the butt, the left taking hold at the barrel. (*TWO*) Change the right hand to the small of the stock.

Being at right shoulder arms.—1. *Left shoulder*, 2. *ARMS.* At the command, execute port arms in two counts. (*THREE*) Let go the rifle with the left hand and, with the right hand still holding the small of the stock, put it on the left shoulder, trigger guard in the hollow of the shoulder; at the same time grasp the butt with the left hand, heel between the first and second fingers, thumb and fingers closed on the stock, left elbow against side. (*FOUR*) Drop right hand quickly to the side.



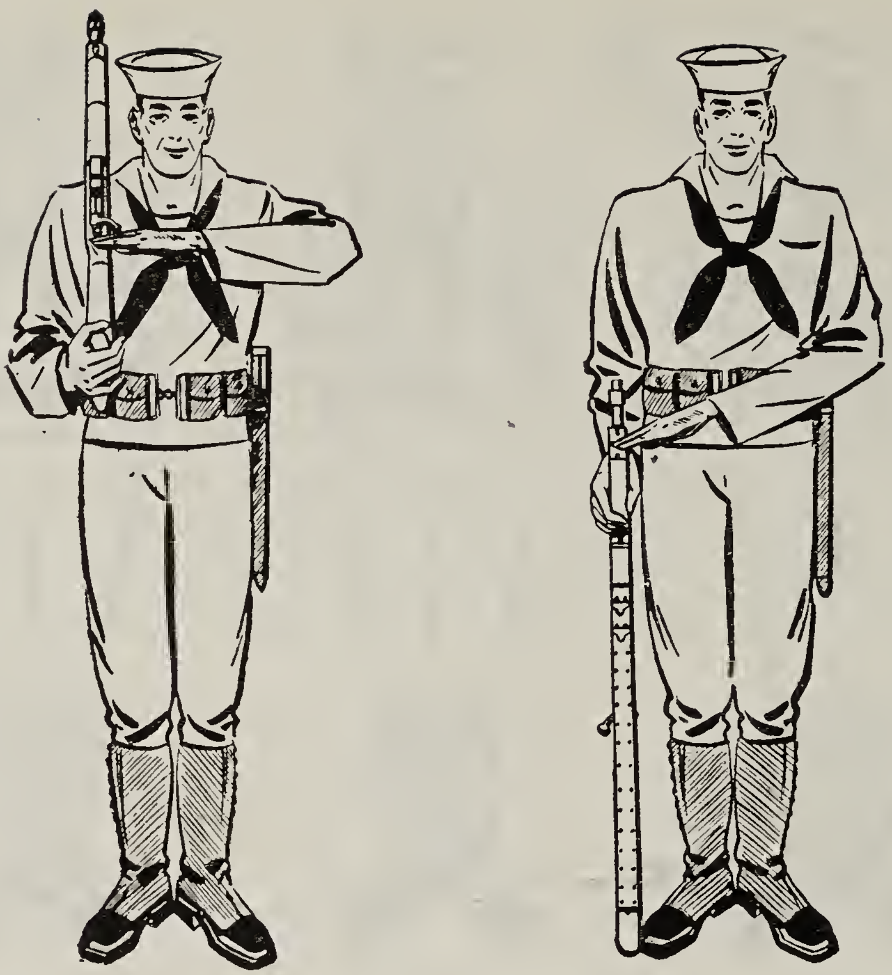
Execution of *left shoulder arms* from port arms.
FIGURE 13-6

Being at left shoulder arms.—1. *Port,* 2. *ARMS.* At the command, grasp the rifle with the right hand at the small of the stock. (*TWO*) Let go with the left hand, carry the piece with the right hand to the position of port arms, and then grasp it again with the left.

Left shoulder arms may be ordered directly from *Order, Right Shoulder,* or *Present Arms.* At the command, *ARMS,* execute port arms and continue in cadence to the position ordered.

Being at left shoulder arms.—1. *Order,* 2. *ARMS.* At the command, execute port arms and complete the movement *Order Arms* from *Port Arms.*

Being at order or trail arms.—1. *Rifle,* 2. *SALUTE.* At the command, carry the left hand smartly to the right side, palm down, thumb and fingers extended and joined, wrist straight, first joint of forefinger between the stacking swivel and the muzzle as the conformation of the man permits, and look toward the person saluted. (*TWO*) Cut away the left hand smartly to the side, turn the head and eyes to the front.

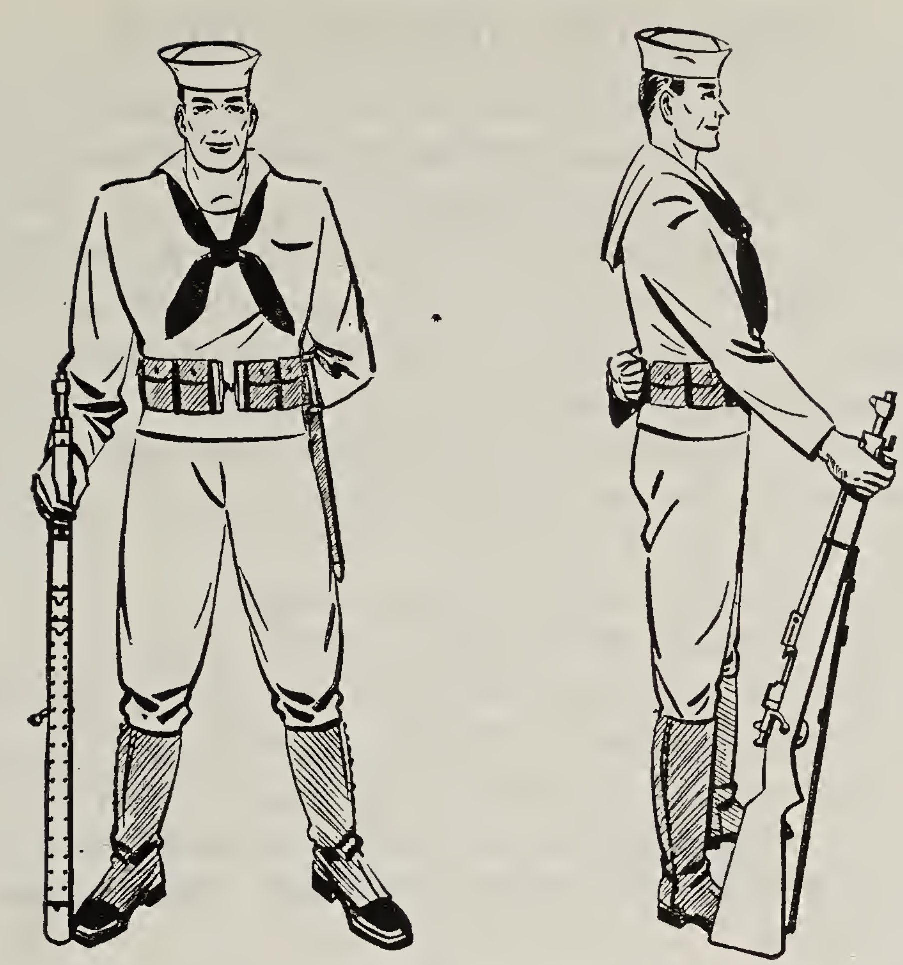


Rifle salute at *Right Shoulder Arms*
and at *Order Arms.*
FIGURE 13-7

Being at right shoulder arms.—1. *Rifle,* 2. *SALUTE.* At the command, carry the left hand smartly to the small of stock, palm down, thumb and fingers extended and joined, first joint of the forefinger touching the end of the cocking piece. Look toward the person saluted. (*TWO*) Cut away the left hand smartly to the side, turn the head and eyes to the front.

Being at port arms.—1. *Right shoulder,* 2. *ARMS.* At the command, change the right hand to the butt. (*TWO*) and (*THREE*) Execute the last two movements as in *Right Shoulder Arms* from *Order Arms.*

Being at order arms.—1. *Parade,* 2. *REST.* At the command, execute *Parade Rest* with left foot as without arms; at same time move the muzzle of the rifle to the front. Keep butt touching right toe. Right arm extended, right hand grasping the rifle just below the upper band, holding the left hand behind the body, resting in the small of the back, palm out.



Position of *Parade Rest.*
FIGURE 13-8

Being at parade rest.—1. *Squad,* 2. *ATTENTION.* At the command, resume the position of *Order Arms.*

Being at order arms.—1. *Fix,* 2. *BAYONETS.* At the command, move the muzzle of the rifle to the left front, grasping it below the stacking swivel with the left hand. Grasp the bayonet with the right hand, back of the hand toward the body; pressing the spring with the forefinger, draw the bayonet from the scabbard and fix it on the barrel. Resume the position of *Order Arms.* This movement is not executed in cadence.

Being at order arms.—1. *Unfix,* 2. *BAYONETS.* At the command, take the position for *Fix Bayonets;* grasp the handle of the bayonet with the right hand, pressing the spring; raise the bayonet until the handle is about 12 inches above the muzzle of the rifle; drop the point to the left, back of the hand toward the body, and return the bayonet to the scabbard, the blade passing between the left arm and the body; regrasp the rifle with the right hand and resume the position of *Order Arms.* This movement is not executed in cadence.

RULES FOR CARRYING RIFLES

1. The rifle is not carried with cartridges in either the chamber or the magazine except when specifically ordered. When loaded, it is carried locked; that is, with the safety lock turned to "Safe." At all other times it is carried unlocked with the trigger pulled. The cut-off is kept turned to "Off" except when cartridges are actually used.

2. Whenever troops equipped with the rifle are formed under arms, pieces are immediately inspected at the command: 1. *Inspection,* 2. *ARMS.* A similar inspection is made before dismissal. If cartridges are found in the chamber or magazine, they are removed and placed in the belt.

3. The bayonet is fixed only when so ordered.

4. *Fall in* is executed with the rifle at *Order Arms.*

5. Before starting any movement for troops armed with rifles, the command, 1. *Right Shoulder,* 2. *ARMS,* is given before the command for movement. Movements may be executed *At Trail Arms* by giving the preparatory command with the words, "At trail," as 1. *At Trail, Forward,* 2. *MARCH.* The position of *Trail Arms* is taken at the command, *MARCH.*

6. When the facings, alignments, open and close ranks, side step, back step, forming for shelter tents, extending and closing are executed from the position of *Order Arms,* the weapon is brought to *Trail Arms* while in motion and the position of *Order Arms* resumed on halting. The position of *Trail Arms* is taken at the command of execution in each case.

7. At the command *HALT,* men armed with the rifle remain at the position of *Right (Left) Shoulder Arms* until the command: 1. *Order,* 2. *ARMS,* is given.

8. In double time under arms, the disengaged hand is held as when without arms.

GENERAL RULES FOR LOADING AND FIRING THE RIFLE AT CEREMONIES

(1) For ceremonial firing, the front rank only of units larger than a squad executes the loading and firing. A squad is always formed in line preliminary to such firing.

(2) Rifles are loaded and locked before any orders for firing are given.

(3) Except during firing, if rifles have been ordered loaded and

locked, they are kept loaded and locked without command until the command *UNLOAD,* or 1. *Inspection,* 2. *ARMS.* During firing, fresh clips will be inserted when the magazine or clip is exhausted.

To load.—(*a*) The unit being in any formation, standing at a halt, the commands are: 1. *With ball (blank, dummy, guard) cartridges,* 2. *LOAD.*

At the command *LOAD,* each front rank rifleman faces half right and carries the right foot 12 inches to the right and to such position as will insure the greatest firmness and steadiness of the body; raises or lowers the rifle and drops it into the left hand at the balance, left thumb extending along the stock, muzzle pointed into the air at an angle of 45 degrees, and turns the cut-off up. With the right hand he turns up the bolt and draws it back; takes a loaded clip and inserts the end in the clip slots; places his thumb on the powder space of the top cartridge, the fingers extending around the rifle and tips resting on the magazine floor plate; forces the cartridges into the magazine by pressing down with the thumb; removes the clip; thrusts the bolt home, turning down the handle; turns the safety lock to the safe and carries the hand to the small of the stock.

(*b*) For instruction in loading, the commands are: 1. *Simulate,* 2. *LOAD.*

At the command *LOAD,* execute loading as described above, except that the cut-off remains off and the handling of the cartridge is simulated.

To unload.—Being in any formation, the command is: *UNLOAD.*

At the command *UNLOAD,* take the loading position, turn the safety lock up, and move the bolt alternately backward and forward until all the cartridges are ejected. After the last cartridge is ejected, the chamber is closed by first thrusting the bolt forward slightly to free it from the stud holding it in place when the chamber is opened, pressing the follower down and back to engage it under the bolt, and then thrusting the bolt home. The trigger is then pulled, the cartridges are picked up, cleaned, and returned to the belt, and the rifle is brought to the order.

To fire the rifle.—Being fully loaded with ball (blank or guard) ammunition, squeeze the trigger for each shot. After each shot draw back and thrust home the bolt with the right hand, leaving the safety lock turned up to the "ready."

To fire by volley.—(*a*) Being in firing formation with rifles loaded, the commands are: 1. *Front rank,* 2. *Ready,* 3. *AIM,* 4. *Squad,*

5. *FIRE.* (For ceremonial purposes, blank ammunition is used and only the front rank executes the commands.)

At the command *Ready,* take the loading position, if not already in that position, and turn the safety lock to the *READY.* At the command *AIM,* raise the rifle with both hands, butt placed and held firmly against the shoulder, left hand well under the rifle and grasping it at or in front of the balance, rifle resting in the palm of the left hand, right elbow at the height of the shoulder, right cheek held firmly against the stock as far forward as it can be placed without straining. The rifle is raised 45 degrees from the horizontal or, if ordered, at the horizontal. The left eye is closed, right eye looking through the notch of the rear sight. At the command *FIRE,* the trigger is squeezed rapidly; the rifle is then lowered to the loading position and loaded.

(*b*) To continue the firing, the commands are : 1. *Aim,* 2. *Squad,* 3. *FIRE.*

Each command is executed as previously explained. *LOAD* (from the magazine) is executed by drawing back and thrusting home the bolt with the right hand, leaving the safety lock turned up to the "ready."

To cease firing.—The command is: *CEASE FIRING.*

At the command *CEASE FIRING,* firing stops; rifles not already at the loading position are brought to that position.

CHAPTER 14

Close Order Drill and Physical Drill with Arms

CLOSE ORDER DRILL—SCHOOL OF THE SQUAD

The squad is a group of men organized as a combat team, made up of one squad leader and other personnel as authorized. When the squad leader is absent, he is replaced by the second in command. In his absence the command is taken by the next senior member of the squad. A squad has, normally, 8 to 12 men.

The squad is usually kept intact. Its normal formation is a single rank or file. This permits variation in the number of men in the squad.

The squad in line marches to the left or to the front only for changes of position.

The squad leader, when in ranks, is posted as the right man of the squad in line or as the leading man in column.

To form the squad.—Command: *FALL IN*. At the command the squad forms in line. Each man, except the one on the extreme left, extends his left arm to the side at shoulder height, palm down, fingers extended, and joined. Each man, except the one on the extreme right, turns his head and eyes to the right, places himself in line so that his right shoulder touches the tips of the fingers of the man on his right. As soon as proper intervals have been obtained, each man drops his arms smartly to his side and turns his head to the front.

To form at close interval.—Command: 1. *At Close Interval*, 2. *FALL IN*. At the command, the men fall in as above, except that close intervals are obtained by placing the left hand on the hip, fingers extended downward and joined, thumb along the forefingers, heel of the hand resting along the hip bone, elbow extended to the side.

The squad falls in on the right file if the squad leader is not in ranks. If the squad is under arms, pieces are inspected.

The squad executes the positions, movements and manual of arms as described in previous chapters, all men executing the movements together.

To dismiss the squad.—Commands: 1. *Inspection*, 2. *ARMS*, 3. *Port*, 4. *ARMS*, 5. *DISMISSED*.

To count off.—Command: *COUNT OFF.* At the command, each man, except the one on the right flank, turns his head and eyes to the right. The right flank man calls out "One." Each man in succession calls out "Two," "Three," etc., turning his head and eyes to the front as he gives his number.

To align the squad. If in line, the commands are: 1. *Dress Right* (*Left*), 2. *DRESS,* 3. *Ready,* 4. *FRONT.* At the command *DRESS,* each man, except the one on the left, extends his left arm (or if at close intervals, places his left hand upon his hip), and all dress to the right. The squad leader places himself on the right flank, one pace from and on the line of the squad. From this position he checks alignment, ordering individuals forward or backward as necessary. Having checked alignment, he faces to the right in marching, and moves three paces forward, halts, faces to the left and commands: 1. *Ready,* 2. *FRONT.* At the command *FRONT,* arms are dropped quietly and smartly to the side, and heads turned to the front.

If in column, the command is: *COVER.* At the command, men cover from front to rear with 40 inches interval between them.

Being in line at normal interval to obtain close interval.—Command: 1. *Close,* 2. *MARCH.* At the command, all men, except the right flank man, face to the right in marching and form at close interval.

Being in line at close interval to extend to normal interval.—Command: 1. *Extend,* 2. *MARCH.* At the command, all men, except the right flank man, face to the left in marching and form at normal interval.

Being in line to march to the flank.—Commands: 1. *Right* (*Left*), 2. *FACE,* 3. *Forward,* 4. *MARCH.* These movements are executed with all men stepping off together.

To march to the oblique.—Command: 1. *Right (Left) Oblique,* 2. *MARCH.* At the command, given as the right foot strikes the ground, each man advances, plants the left foot, faces half right, and steps off in a direction of 45 degrees to the right. He keeps his relative place, shoulders parallel to those of the guide, and regulates his steps so that his ranks stay parallel to the original front.

The command *HALT* is given on the left foot when halting from the right oblique march, and on the right foot when halting from left oblique march.

At the command *HALT* (from left oblique march), given as the left foot strikes the ground, each man advances, planting the right foot, turns to the front on the ball of the right foot, and brings the left foot to the side of the right.

To resume original direction, the command is: 1. *Forward,* 2. *MARCH.* At the command, each man faces half left in marching and moves straight to the front. If at half step, or marking time while in oblique march, the full step is resumed by the command: 1. *Oblique,* 2. *MARCH.* To give strength to the command the word "oblique" is pronounced to rhyme with "strike."

To march toward the flank.—Command: 1. *By the Right (Left) Flank,* 2. *MARCH.* At the command, each man simultaneously executes the movements as described in "School of the Recruit."

Being in column, to change direction.—Command: 1. *Column Right (Left), (Half Right) (Half Left),* 2. *MARCH.* At the command, the leading man executes the movement immediately; the others in succession as they reach the pivot point.

Being in line to take interval and assemble.—Command: 1. *Take Interval to the Left (Right),* 2. *MARCH.* At the command, the right flank man stands fast, extends his left arm at shoulder height, palm down, fingers extended and joined, until the man on his left obtains the proper interval, then drops his arm. Other men face to the left in marching and step out until they have an interval of two arms' length from the man on their right, then halt and face to the front. Each man, except the one on the left who raises his right arm only, extends both arms laterally at shoulder height. Each man, except the right flank man, then turns his head and eyes to the right and places himself in line, so that the finger tips of his right hand touch those of the left hand of the man on his right. As soon as each man aligns himself at two arms' length he drops his right arm to the side and turns his head and eyes to the front. He drops his left arm when the man on his left has obtained the proper interval.

To assemble, the command is: 1. *Assemble to the Right (Left),* 2. *MARCH.* At the command, the right flank man stands fast; all other men face to the right in marching and form at normal interval.

To stack arms.—The squad being in line at normal or close interval, the command is: 1. *Stack,* 2. *ARMS.* The second man from the right and the second man from the left of the squad make the stacks. If there are less than 6 men in the squad, only one stack is made (by the second man from the right). If there are more than 8 men in the squad, 3 stacks are made; the center or right-center men make the center stack.

The stack is made as follows: At the command, *ARMS,* the man on the left of the stack man grasps his rifle with the right hand at the balance, carrying it to the horizontal position, barrel up, and passes his rifle to the stackman, who grasps it with his left hand between the upper-sling swivel and stacking swivel and places the butt between his feet, barrel to the front, muzzle inclined slightly to the front, the thumb and forefinger raising the stacking swivel. The stackman then throws the butt of his own rifle two feet in advance of that of his left file and 6 inches to the right of his own right toe; at the same time he allows his right hand to slip to the stacking swivel and engages his rifle with that of his left file.

The man on the right of the stackman raises his rifle with his right hand, regrasps it with his right hand at the balance, steps to the left front, keeping his right foot in place. He carries his rifle well forward, barrel to the front. His left hand guides the lower hook of the stacking swivel of his own rifle to engage the free hook of that of his left file. He then turns the barrel outward to the angle formed by the other two rifles, and lowers the butt to the ground so that it will form a uniform stack with the other two rifles. He then assumes the position of attention. Other rifles of the squad are passed toward the nearest stack and laid on the stack by the stackman.

To take arms.—The squad being in line behind the stacks, the command is: 1. *Take,* 2. *ARMS.* At the command *ARMS* the procedure of stacking arms is reversed. The loose rifles are first passed back. In breaking the stack, the stackman grasps his rifle and that of the man on his left, so that the rifles will not fall when the man on the right raises and disengages his rifle. Each man, as he receives his rifle, resumes the position of *Order Arms.*

Column of twos.—When marching small groups, not at drill, the group may be marched in column of twos by forming it in two ranks and giving the command: 1. *Right (Left),* 2. *FACE.*

To form column of twos from single file and reform.—The squad being in column, at halt, to form a column of twos, the command is: 1. *Form Column of Twos,* 2. *MARCH.* At the command, the leading man stands fast; the second man in the squad moves by the oblique until he is to the left of and abreast of the squad leader with normal interval, and halts. The third man moves forward until behind the squad leader at normal interval and halts. The fourth man moves by the oblique until he is to the left of and abreast of the third man at normal interval, and halts; and so on.

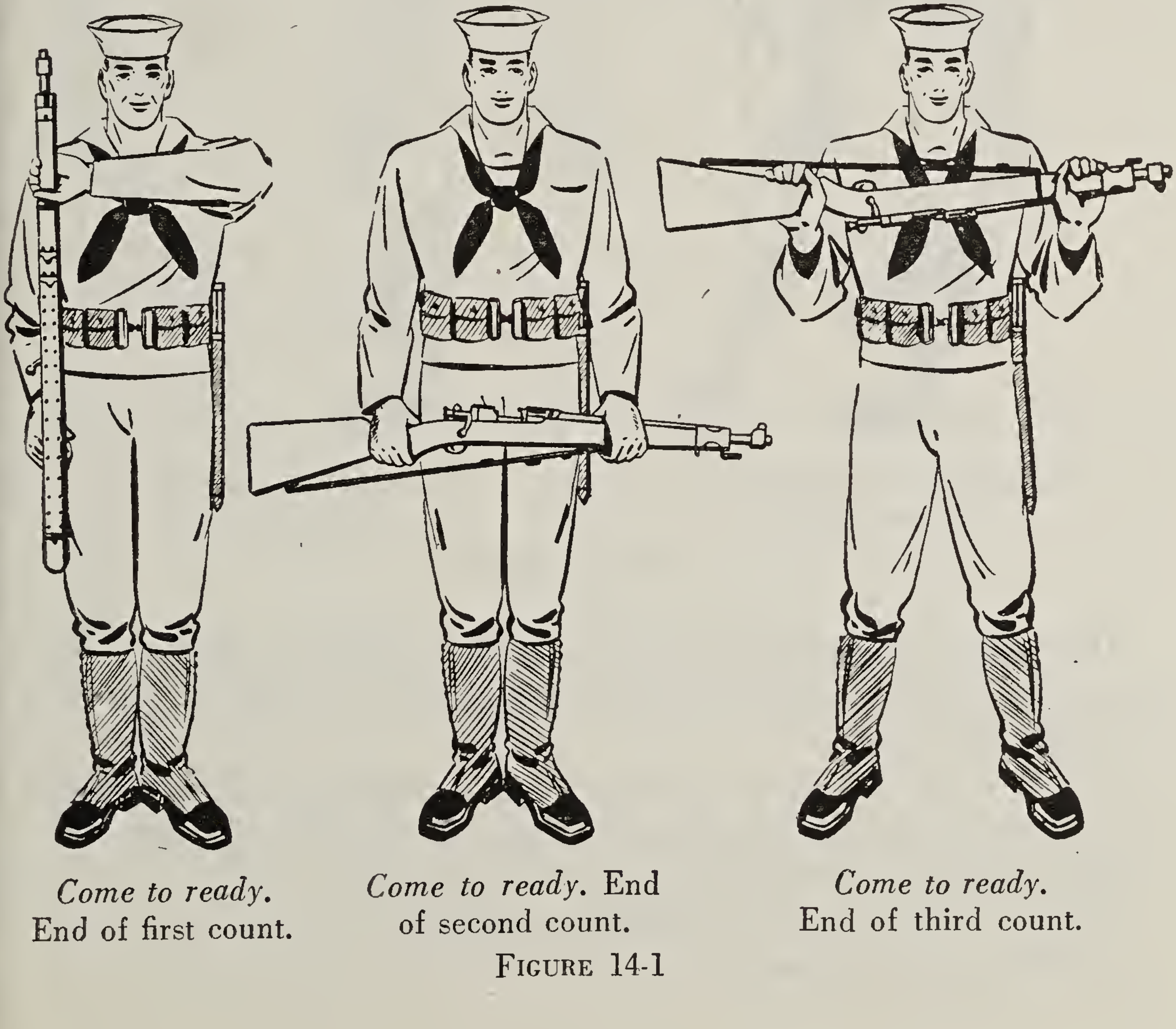
The squad being in column of twos, in marching, to reform single file, the squad is first halted. The command is: 1. *Form Single File From the Right*, 2. *MARCH*. At the command, the leading man of the right column moves forward. The leading man of the left column steps off to the right oblique, and then executes left oblique so as to follow the right file at normal interval. The remaining twos follow successively in the same way.

PHYSICAL DRILLS WITH ARMS

All movements in this section are in four counts and, with the exception of *Come to Ready*, are performed four times. The exercises may be executed by command, or to music, or silently, following the motions of a leader, and may be discontinued by the command, *HALT*, when the *Ready* will be resumed.

Come to ready.—Command: 1. *Come to Ready*, 2. *ONE*, 3. *TWO*, 4. *THREE*.

ONE—Raise the piece with the right hand, grasp it with the left



Come to ready. End of first count.

Come to ready. End of second count.

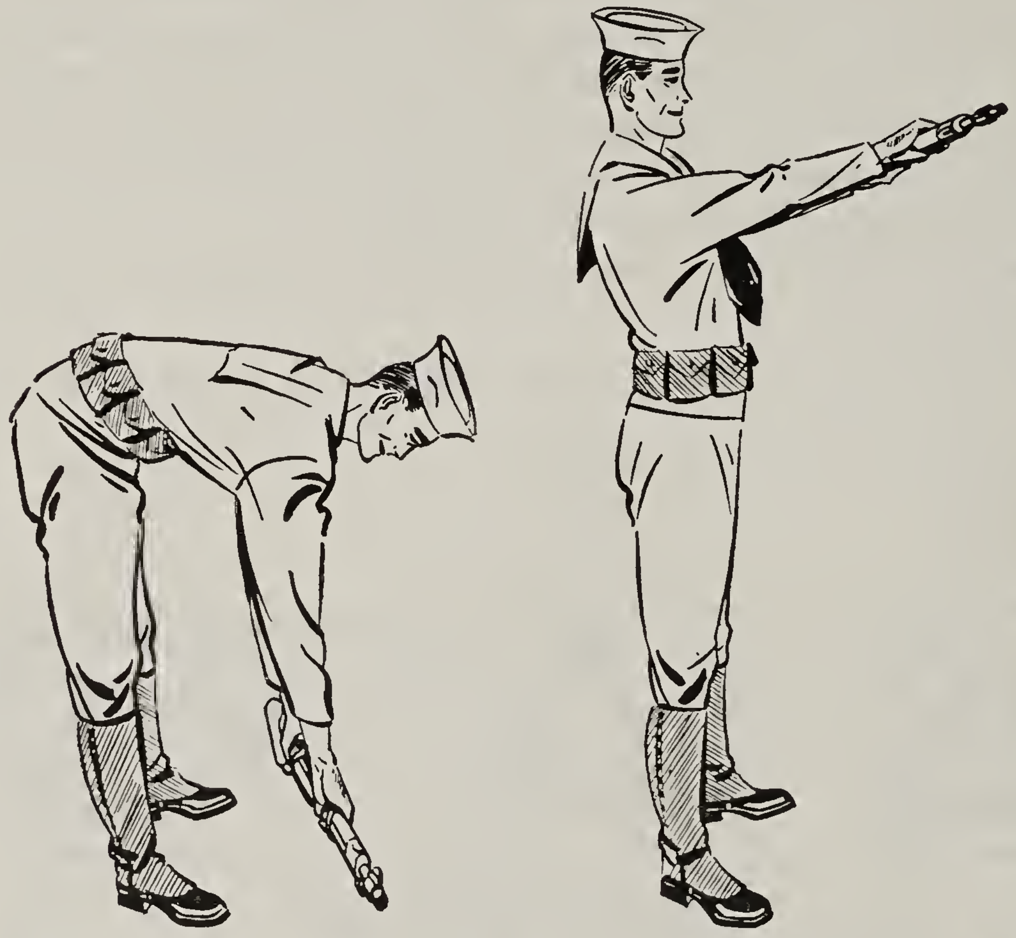
Come to ready. End of third count.

FIGURE 14-1

at the height of the right shoulder, knuckles toward the body. The right hand grasps the small of the stock, forefinger under the guard.

TWO—Let the piece drop in front of the body to a horizontal position, sling down, keeping the body erect.

THREE—Raise the piece horizontally to the height of the shoulders, sling up, at the same time moving the left foot to the left about 12 inches. Keep the chest out and the shoulders well back. *Ready* is the starting point of all the physical drill under arms.



Down and forward. End of first count.

Down and forward. End of third count.

FIGURE 14-2

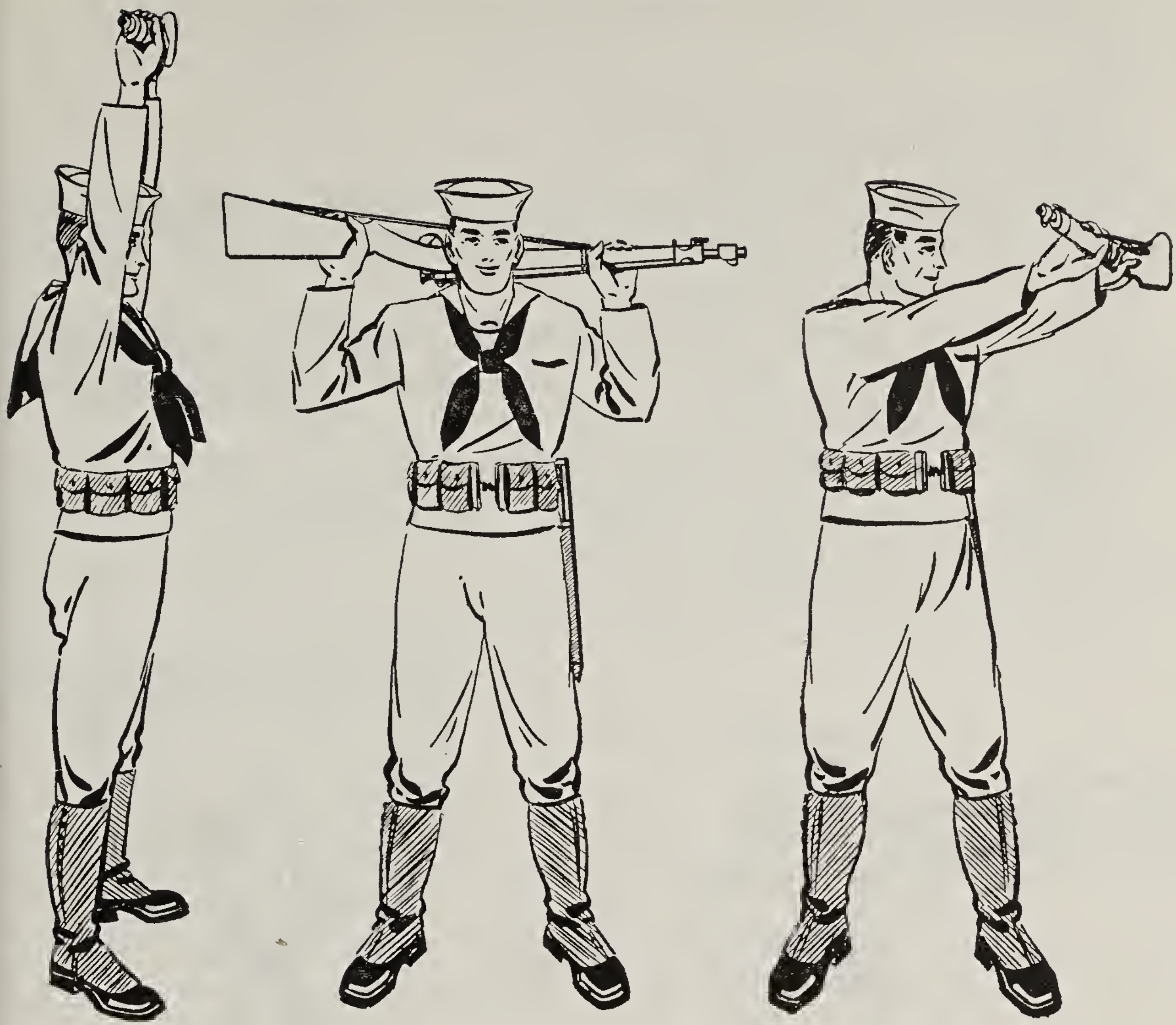
Down and forward.—To exercise the muscles of the hips, back and arms. Command: 1. *Down and forward,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR.*

ONE—From *Ready,* lower the piece horizontally to the insteps, keeping the arms and knees straight, or as straight as possible.

TWO—Back to *Ready,* chest out, elbows back.

THREE—Push piece horizontally forward.

FOUR—Back to *Ready.*



Forward and up. End of third count. *Up and shoulders.* End of second count. *Side pushes.* End of first count.

FIGURE 14-3

Forward and up.—To exercise the muscles of the arms and side walls of the chest. Command: 1. *Forward and up*, 2. *ONE*, 3. *TWO*, 4. *THREE*, 5. *FOUR*.

ONE—From *Ready*, push out horizontally forward as in last exercise.

TWO—Back to *Ready*, chest out, elbows back.

THREE—Push the piece to high vertical, keeping it horizontal, and expanding chest.

FOUR—Back to *Ready*.

Up and shoulders.—To exercise the muscles of the arms and of the side and front walls of the chest. Command: 1. *Up and shoulders*, 2. *ONE*, 3. *TWO*, 4. *THREE*, 5. *FOUR*.

ONE—From *Ready*, push the piece to vertical, as in last exercise.

TWO—Lower piece to back of shoulders, head up, elbows well back.

THREE—Up again to vertical.

FOUR—Down to *Ready*.

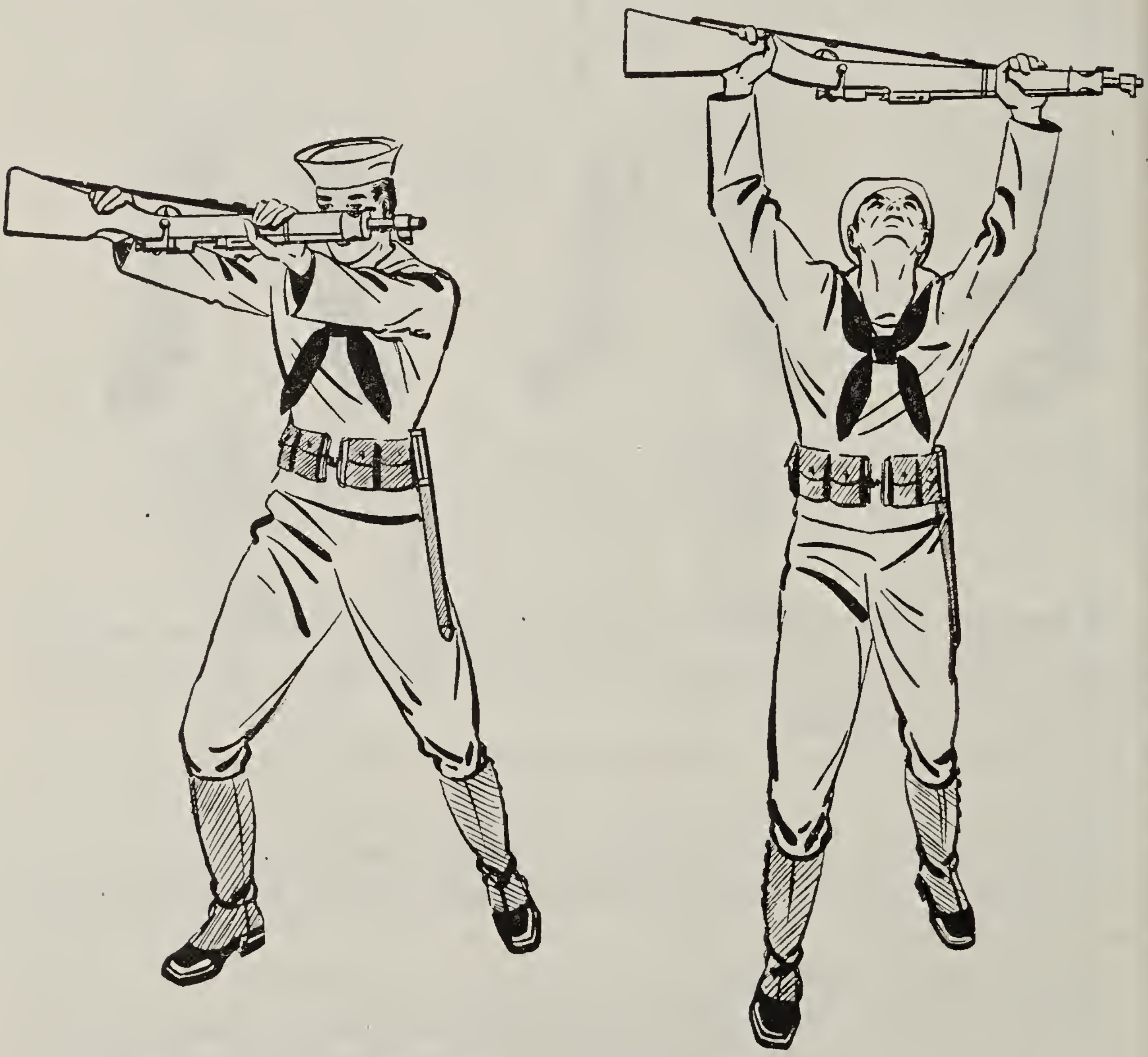
Side pushes.—To exercise the rotary muscles of the body and thighs and the loin muscles. Command: 1. *Side pushes,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR.*

ONE—From *Ready,* push the piece horizontally to the right side, twisting the body, keeping the eyes on the piece but keeping the heels firmly on the ground.

TWO—Back to *Ready,* chest out, elbows back.

THREE—Push the piece to the left side, as above.

FOUR—Back to *Ready.*



Diagonal lunges. End of first count.

Forward lunges. End of first count.

FIGURE 14-4

Diagonal lunges.—To exercise the muscles of the arms, back, and legs. Command: 1. *Diagonal Lunges,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR.*

ONE—From *Ready,* lunge about 36 inches diagonally to the right, with the right foot, at the same time pushing the piece out horizontally. The left foot should be flat and the eyes directed to the piece.

TWO—Back to *Ready,* chest out, elbows back.

THREE—Lunge to the left with left foot, as above.

FOUR—Back to *Ready.*

Forward lunges.—To exercise the muscles of the arms and legs and the side walls of the chest. Command: 1. *Forward Lunges,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR.*

ONE—From *Ready,* lunge about 36 inches directly to the front, with the right foot, at the same time pushing the piece horizontally to vertical and directing the eyes to the piece. Keep left foot flat.

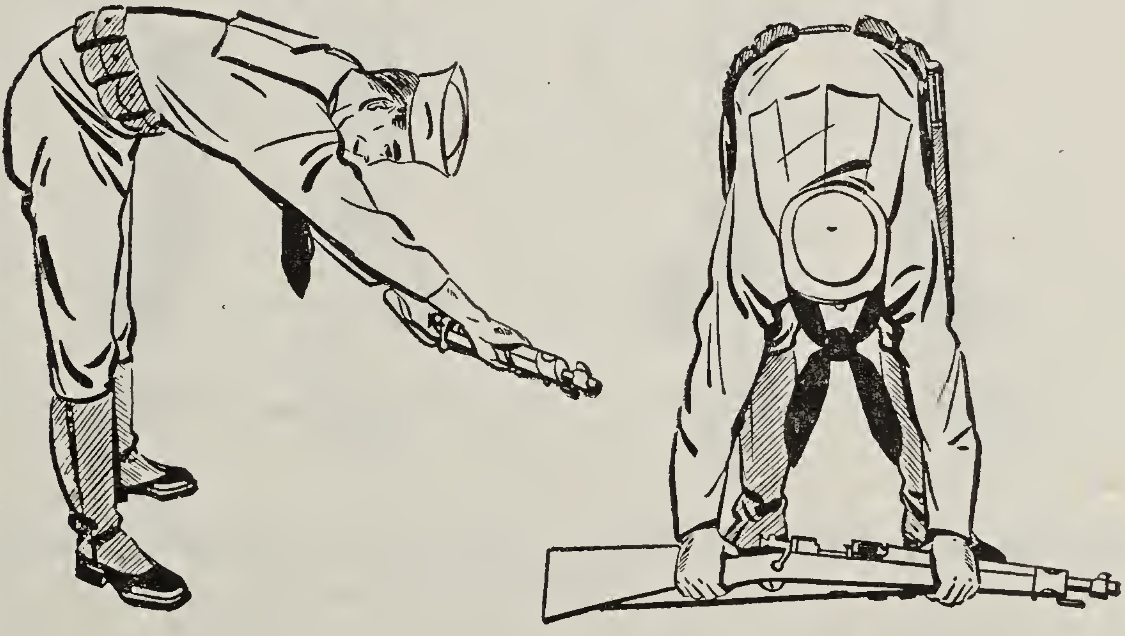
TWO—Back to *Ready.*

THREE—Lunge to the front with left foot, as above.

FOUR—Back to *Ready.*

Front sweeps.—To exercise all the principal posterior muscles of the body. Command: 1. *Front Sweeps, Slow,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR.*

ONE—From *Ready,* raise the piece horizontally to high vertical, keeping the chest well out and emphasizing the up-stretch.



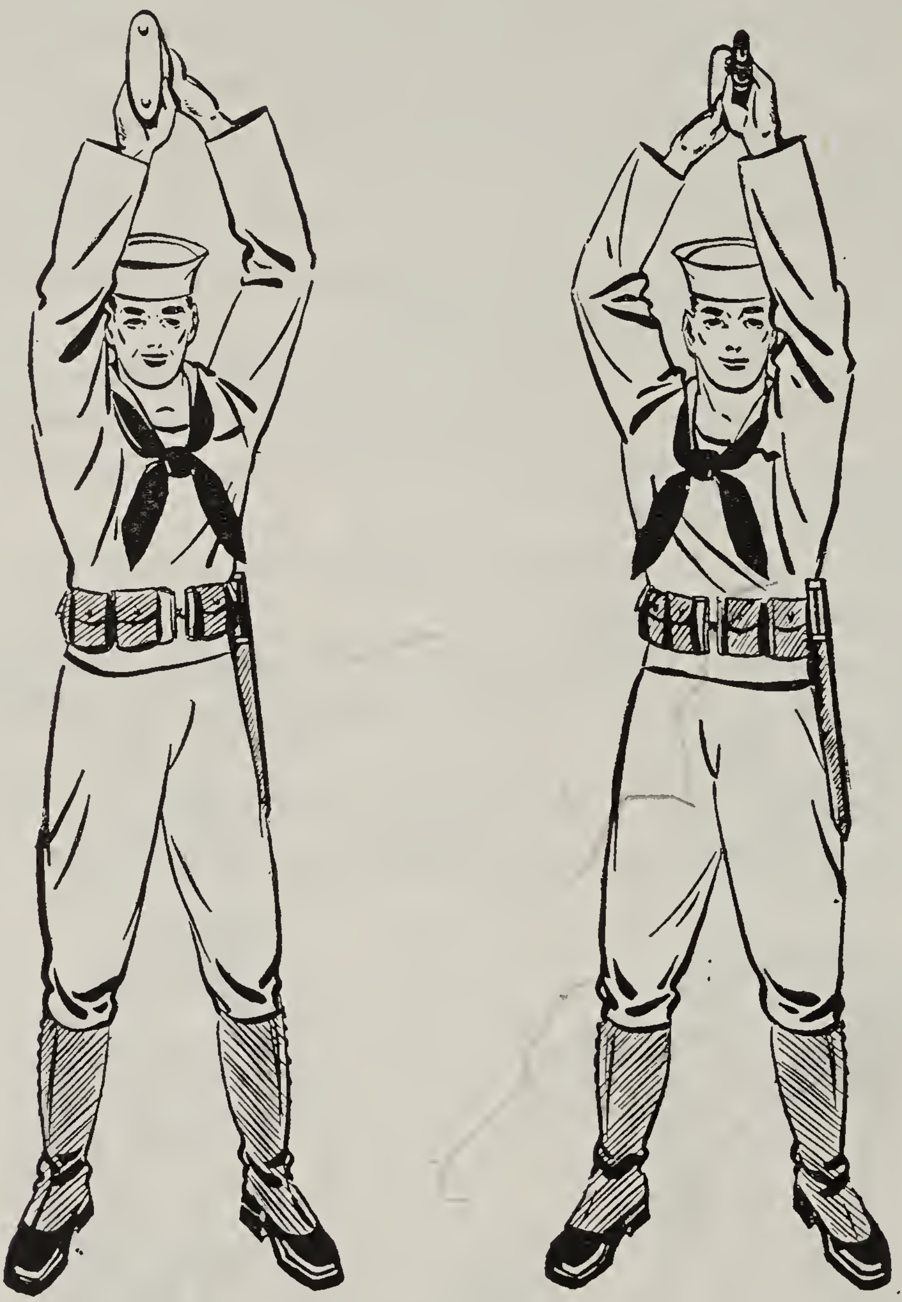
Front sweeps. *Front sweeps.* End of second count.

FIGURE 14-5

TWO—Lower the piece slowly in a front semicircle to insteps, keeping the arms straight and emphasizing the out-reach.

THREE—Raise the piece slowly in a front semicircle to vertical.

FOUR—Down to *Ready.*



Overhead twist. Butt front. *Overhead twist.* Muzzle front.

FIGURE 14-6

Overhead twists.—To exercise the rotary muscles of the upper part of the body; also to stimulate circulation. Command: 1. *Overhead twists, Butt front,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* 6. *Muzzle front,* 7. *ONE,* 8. *TWO,* 9. *THREE,* 10. *FOUR.*

ONE—From *Ready,* raise the piece overhead, at the same time twisting it till the butt points directly forward. Keep the piece horizontal.

TWO—Twist the piece to the right until the muzzle points directly forward. Hold the hips firmly forward, confining the movement to the upper part of the body.

THREE—Twist back till the butt points directly forward.

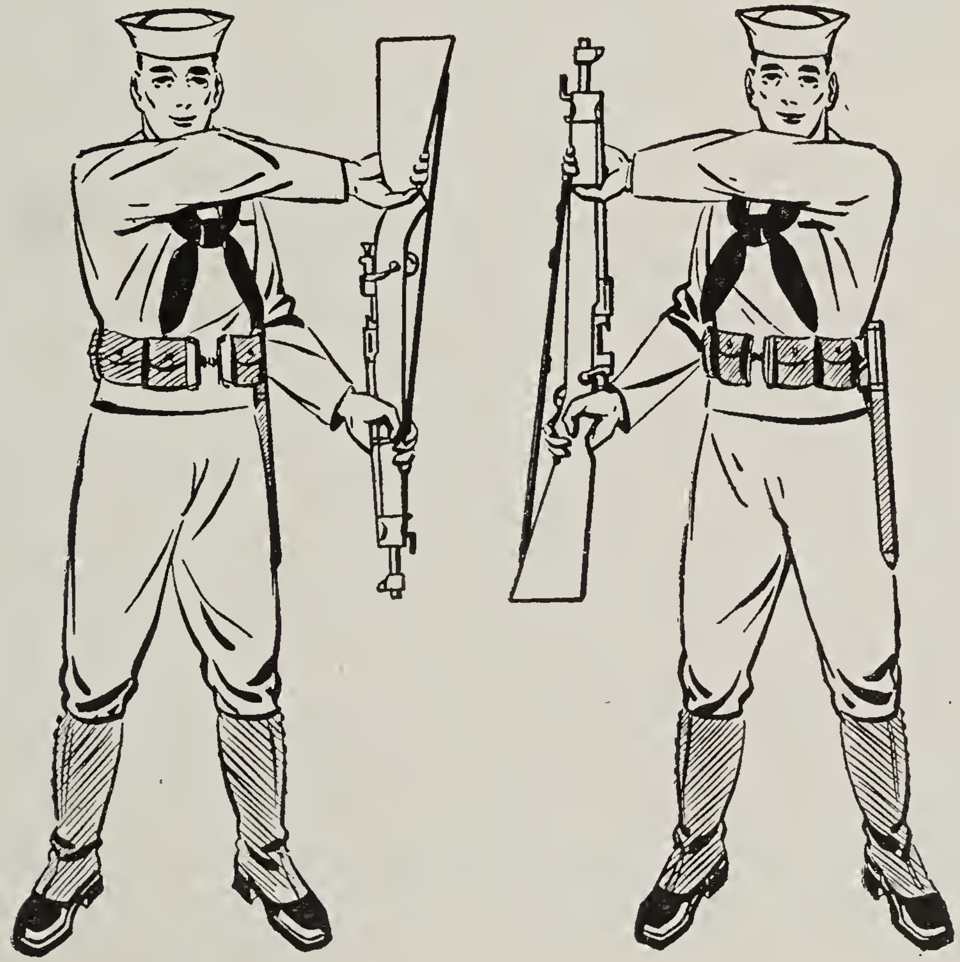
FOUR—Lower the piece to *Ready.*

ONE—From *Ready,* raise the piece overhead, at the same time twisting it till the muzzle points directly forward.

TWO—Twist the piece to the left until the butt points directly forward.

THREE—Twist back until the muzzle points forward.

FOUR—Lower the piece to *Ready.*



Side twist. End of second count. *Side twist.* End of fourth count.

Figure 14-7

Side twists.—To exercise the muscles of the sides, loins and small of the back. Command: 1. *Side Twists,* 2. *ONE,* 3. *TWO,* 4. *THREE.* 5. *FOUR.*

ONE—From *Ready*, drop the piece horizontally in front to position No. 2 in coming to *Ready*.

TWO—Lift the butt up; carry the piece strongly to the left side and out, muzzle pointing directly down. Keep the hips firm.

THREE—Return the piece to position No. 2 in coming to *Ready*.

FOUR—Lift the muzzle; carry the piece strongly to the right side and out, muzzle pointing directly up.

At the end of this exercise, come to *Order Arms*.

CHAPTER 15

Extended Order Drill

GENERAL RULES

The following general rules apply to all extended order exercises:

1. Extended order exercises are executed at ease.

2. Extended order exercises are not disciplinary or precision drills. Straight lines are avoided except when halted behind cover.

3. Extended order exercises should be held on ground giving concealment and cover. When such ground is not available close to the ship or station, basic training is given on flat or bare drill grounds only to teach the mechanism of deployment and to illustrate the different formations and movements.

4. Drills should always follow definite tactical situations as regards own and enemy fire, dispositions, movements or observation.

5. The terrain, enemy fire and the necessities of control and room for maneuver are the governing factors which determine suitable distances and intervals between units. On open ground, when visibility is good, the minimum distance or interval between individual men in extended order formation is 5 paces. As visibility decreases, control becomes more difficult. Intervals and distances between individuals and units are decreased in woods, fog, smoke and darkness.

6. The company commander should prescribe the formation for his company as a whole and may prescribe the initial formations for platoons and squads. However, during the advance, the leaders of platoons and squads should be given full initiative in changing the formation of their units to make best use of ground and cover.

7. In combat, great responsibilities are placed upon the petty officer. In extended order drill he should have opportunity to develop initiative and leadership.

8. The platoon leader and senior petty officers control their squads through the squad leaders. They issue orders to the squad leaders and see that they are carried out.

9. The prone position is the usual position for the skirmisher when deployed and not advancing. The sitting or kneeling position may be used to obtain a better field of fire.

10. Platoon leaders deploy, assemble and maneuver their units as far as possible by arm signals. The whistle is used as a preliminary to a command when, on account of the noise of battle, it is impossible to attract the attention of petty officers and skirmishers by other means.

11. Changes in the direction of march are usually accomplished by assigning a new march direction to the base squad. Skirmishers place themselves on the new front and re-establish their proper intervals by gradually opening out from or closing in on the base squad as necessary.

12. Movements may be interrupted by the commands *HALT* or *DOWN*. On halting, a deployed line usually faces in the direction of the enemy. If halted by the command *DOWN*, skirmishers take cover, and those in the assault wave or on an exposed flank get ready to open fire.

13. Deployment as skirmishers is made at a run. Other movements are made at a walk unless otherwise ordered.

FIRE ORDER

A fire order consists of three elements: range, designation of the target, and the order to commence firing. The sequence is:

Range.—Being in any firing formation, rifles being loaded, the commands are: *RANGE, SIX HUNDRED (FIVE HUNDRED, THREE FIFTY, etc.)* or *BATTLE SIGHT*. At this command sights are set as ordered.

Designation of the target.—The target must be specifically designated, either by a tracer bullet or by pointing with arm or rifle and describing it orally. Designation of the target may be omitted when it appears suddenly and is unmistakable.

To commence firing.—Being in firing formation the command is: *COMMENCE FIRING*. Each man independently comes to the ready, aims carefully at the target, fires, reloads and continues firing until ordered to cease firing.

Examples of fire orders are: 1. *RANGE, FIVE HUNDRED*, 2. *ENEMY THERE* (pointing), 3. *COMMENCE FIRING*.

1. *BATTLE SIGHT*, 2. *COMMENCE FIRING* (in case the target appears suddenly and is unmistakable).

DISTANCES AND INTERVALS

Distances and intervals between men when deployed.—The interval of five paces between men is subject to variation. The squad leader may direct lesser or greater intervals and distances, and the individual skirmishers may vary their position so as to take full advantage of cover or concealment. Close grouping in the open is generally avoided, but two or three men may group together to take advantage of a point of good cover or concealment.

DISPOSITIONS

Dispositions of the rifle squad are: *Squad Column, As Skirmishers, As Skirmishers Right (or Left), Squad Wedge.*

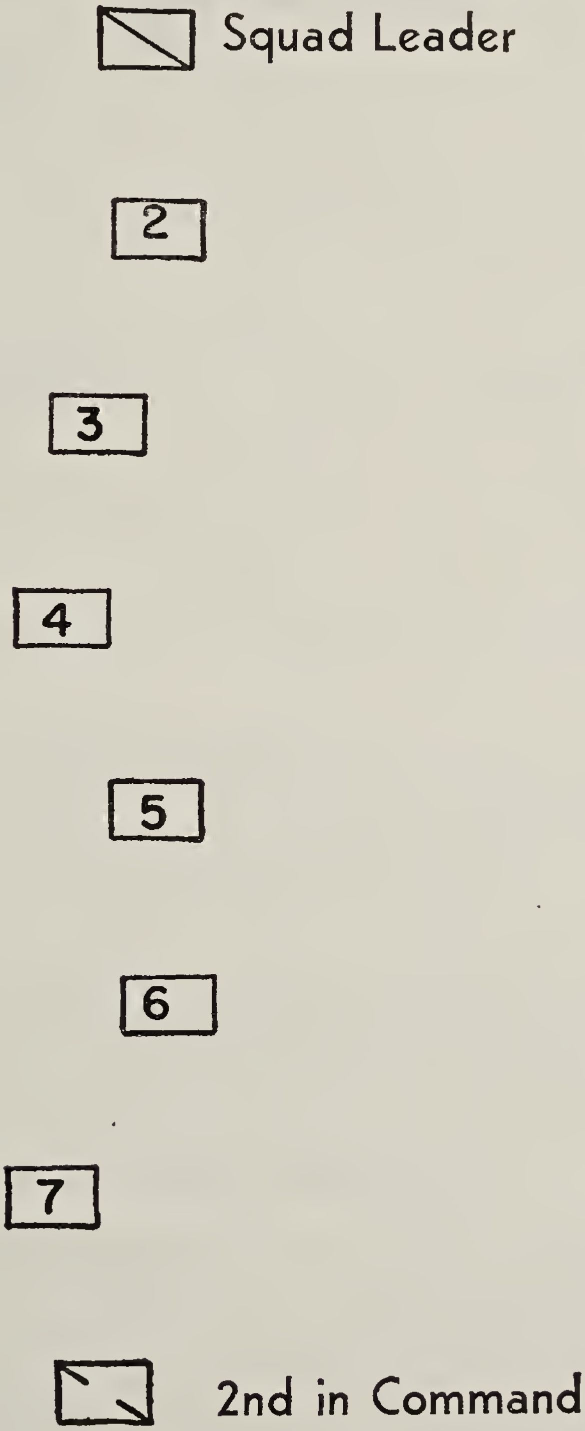


FIGURE 15-1.—Squad column (distance between men, 5 paces; depth of column, 40 paces; width, 5 to 20 paces).

Squad column.—At this command squad members form in an irregular column behind the squad leader. The disposition of individuals in the column is adapted to the terrain and other conditions and may vary from a widely spaced and staggered column suitable for crossing very open country to a column of files closed up behind the leader.

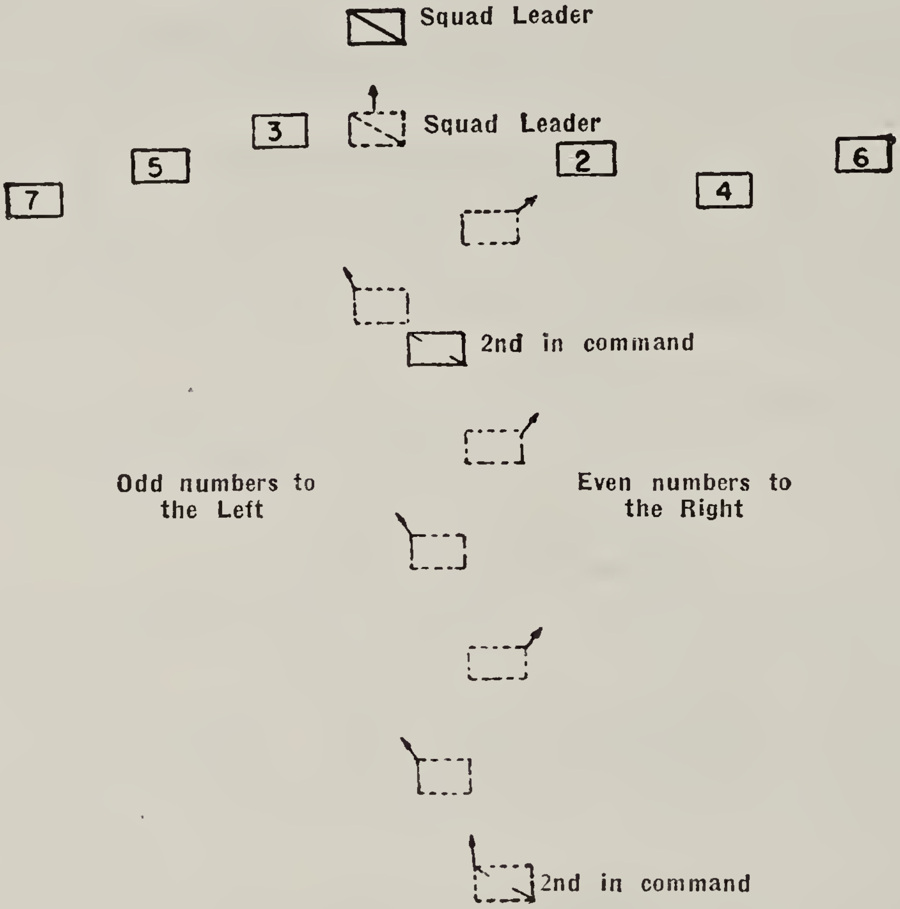


Figure 15-2.—As skirmishers (interval between men, 5 paces; frontage of squad, 40 paces).

As skirmishers.—At this signal or command, usually given when in squad column but permissible from any disposition, the squad deploys in an irregular line. Even numbers go to the right, odd numbers to the left. The squad leader is in front of his squad when advancing. When it halts to fire he drops back behind the line to a position from which he can control his squad and observe the front. If there is an automatic rifleman in the squad, he joins the squad leader and waits orders for any special fire mission.

As skirmishers right (left).—At this signal or command, usually given when in squad column but permissible from any disposition, the squad deploys to the right. The squad leader is in front

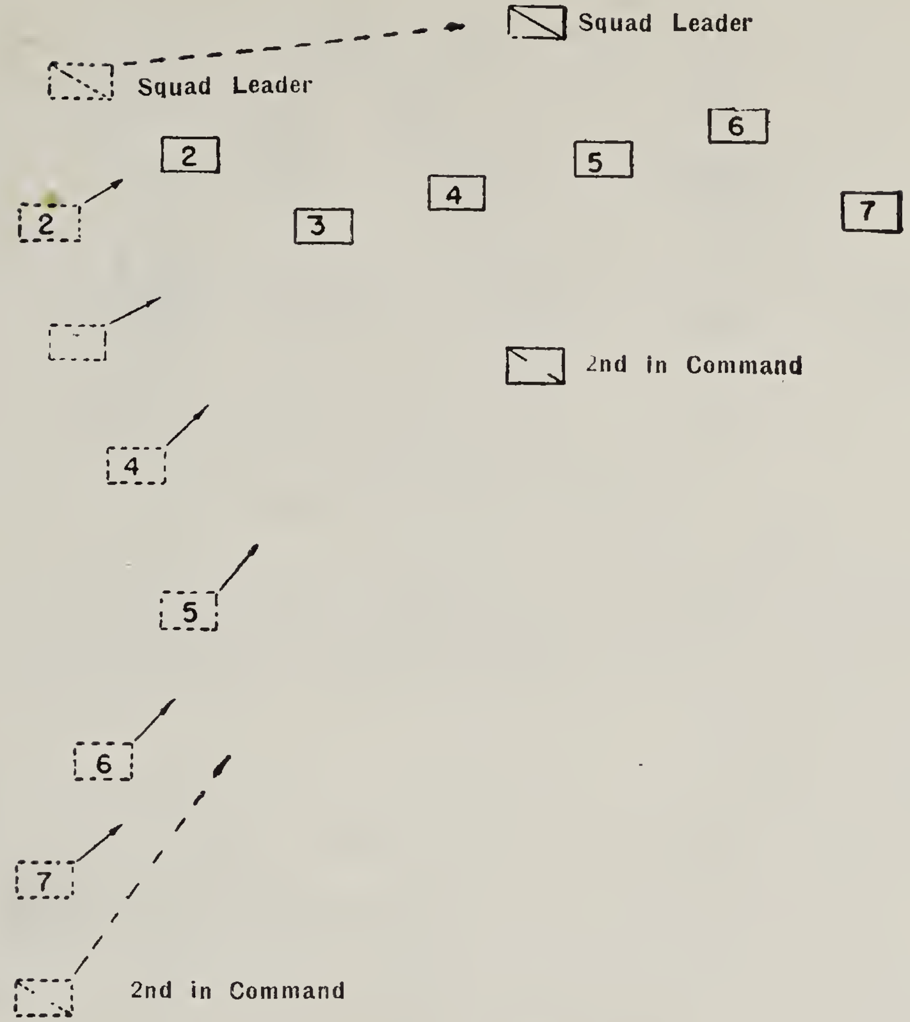


FIGURE 15-3.—As skirmishers right (or left).

of his squad when it is advancing. When it halts to fire he drops back behind the line to a point from which he can control his squad and observe the front. The automatic rifleman in the squad joins the squad leader and waits for special orders.

Squad wedge.—At this command, usually given when in squad column, the men dispose themselves in an irregular wedge behind the squad leader. If there is an automatic rifleman in the squad, he takes position in the center of the wedge unless otherwise directed.

MOVEMENTS

Advance by individuals.—To advance by individuals the squad leader indicates the objective, the man or men who are to start the movement, and commands or signals: *FORWARD.* Each man chooses the time and method for his own advance to take advantage of existing cover and to avoid enemy fire. If the objective is not indicated,

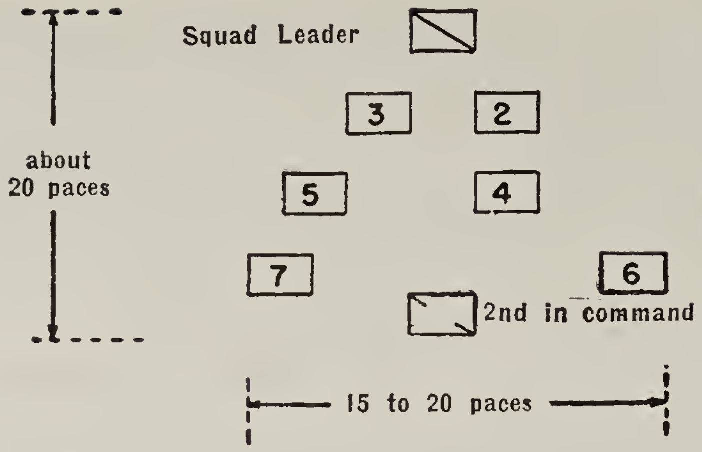


FIGURE 15-4.—Squad wedge.

the leading men select the next cover or firing position. They do not advance so far as to lose contact with their squad leader. The squad leader follows after the first three or four men, directing their advance, if necessary.

Rushes.—When it is desired to move the entire squad simultaneously from cover to cover, the leader commands: 1. *Prepare to Rush*, 2. *FOLLOW ME.* At the command, *FOLLOW ME*, all men spring forward, following the example of the leader. If necessary for safety, the squad leader may first command: *CEASE FIRING.*

When only part of the squad is to move the leader designates who is to move and the position to be taken. The rush terminates when the squad has closed with the enemy or when the leader commands or signals: *DOWN.*

Follow the squad leader.—The leader places himself in front of his unit and commands: *FOLLOW ME.* The other members of the squad follow him, retaining the approximate disposition of the unit at the time when the command was given.

To assemble the squad.—At the signal or command *ASSEMBLE*, the squad assembles behind the leader and in column with 40 inches distance between men.

Scouts.—In each rifle squad, the second and third man are designated as scouts.

When advancing in the presence of the enemy, the squad (platoon or company) is preceded by its scouts who seek out the enemy and prevent surprise. Scouts precede the squad at sufficient distance to protect it from surprise small-arms fire.

The command for scouts to precede their unit is: *SCOUTS OUT.* They move forward in front of their unit but maintain contact with it.

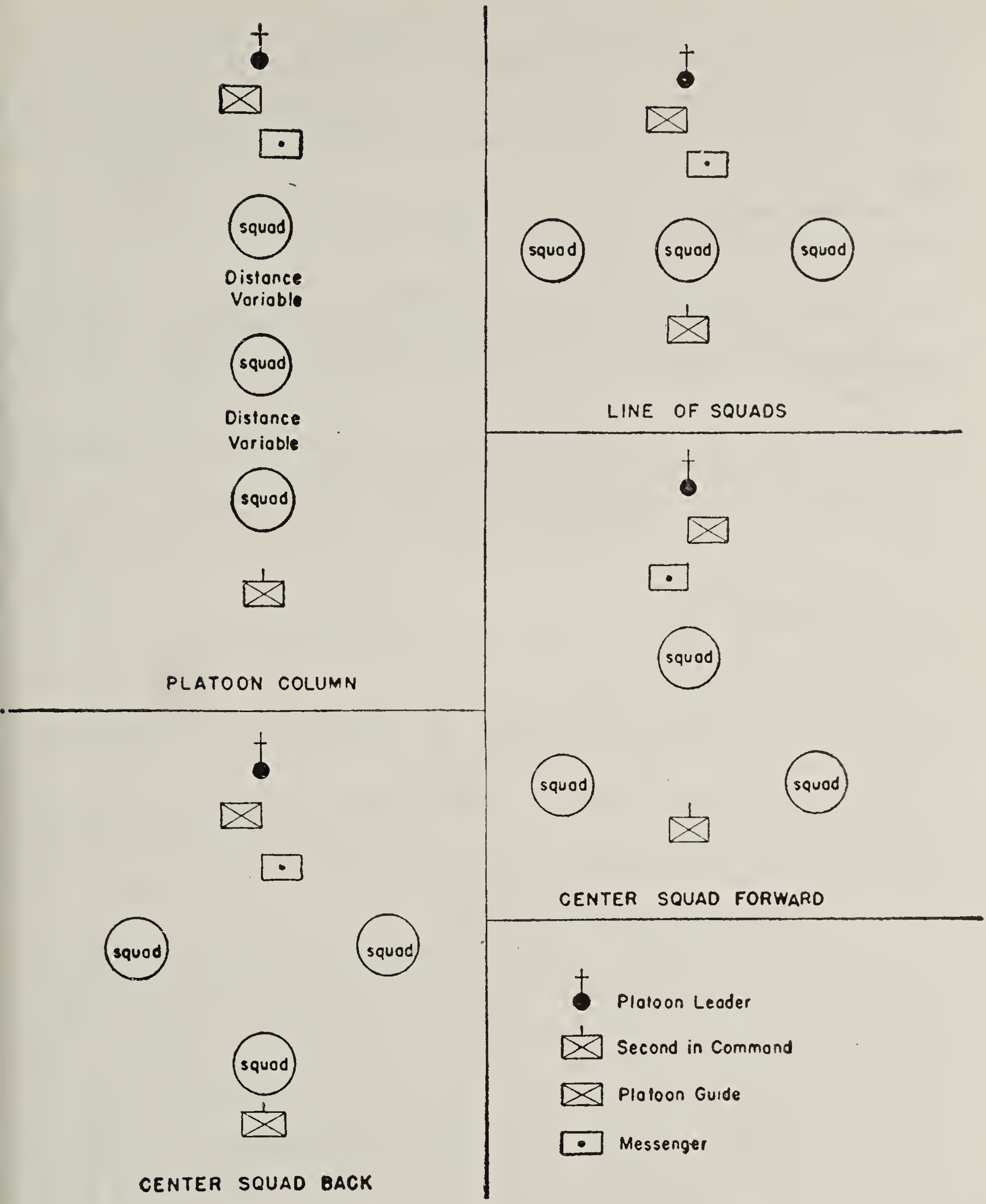


FIGURE 15-5.—Dispositions of the rifle platoon in extended order.

EXTENDED ORDER—RIFLE PLATOON

Platoon deployment and advance.—The platoon deploys in any direction in silence and without confusion. The direction of advance may be indicated by the leader pointing or moving in that direction; by designating prominent terrain features such as a building or lone tree; by indicating to the leader of the base unit the route to be followed; or by any combination of the above. Where an advance is to take place in an assigned direction for a considerable time, both a distant direction point and a magnetic azimuth should be given.

The base squad.—The center rifle squad is the base squad, with the following exceptions:

1. When in platoon column, the leading squad is the base squad.
2. When deployed in squad columns or as skirmishers with one squad back, the right flank squad is the base squad unless otherwise indicated.
3. The movements of other squads of the platoon are based on the direction and relative position of the base squad.

Dispositions. The platoon may use any of the following dispositions:

1. Column of threes.
2. Column of twos.
3. Platoon column.
4. Line of squads.
5. One rifle squad forward, two rifle squads back, automatic rifle squad in rear.
6. Two rifle squads forward, center rifle squad back, automatic rifle squad in rear.

When the platoon is deployed, each squad may be in *Squad Column, Squad Wedge* or *As Skirmishers.*

Frontage.—The platoon deploys with sufficient intervals between squads to permit maneuvers of squads. Unless otherwise directed, squad columns or squads disposed as a wedge keep about 50 yards apart. When deployed as skirmishers, adjacent squads deploy with about 20 yards interval between squads unless otherwise directed.

Posts of leaders, guide, messenger and scouts.—The platoon leader and the second in command are not restricted to fixed posts. When moving forward, the platoon leader usually precedes his unit, the second in command follows in the rear and assists in control. During forward or flank movements, the platoon leader is on the side of the platoon toward the enemy. During movements to the rear, he is on the side away from the enemy. When the platoon is halted in a firing position, he is in rear of his platoon. When otherwise halted, he is in front of his platoon. The second in command takes positions from which he can best assist the platoon leader in controlling the platoon.

The platoon guide and the messenger join the platoon leader on deployment. When contact is imminent the platoon leader sends out scouts from the leading squads. No more scout pairs than are necessary to cover the front of the platoon will be used.

Platoon column.—At the signal or command, the center squad moves out in squad column, followed in order by the right and left rifle squads, or in any other order indicated by the platoon leader. Usually the automatic rifle squad follows in rear.

Deploy in squad columns. 1. *With squad columns in line.*—The Command is: *SQUAD COLUMNS.* The base or leading squad moves in squad column to the front or in the direction indicated by the platoon leader. The other rifle squads move in squad column to positions approximately 50 paces to the right and left of the base or leading squad at about 50 paces. Leaders of the flank rifle squads guide on the base squad but make no effort to maintain exact alignment.

2. *In squad columns with one rifle squad forward.*—At the command, *SQUAD COLUMNS,* the base (or designated) rifle squad moves in squad column to the front or in the direction indicated by the platoon leader, the other two rifle squads move in squad column to the right and left until about 50 paces apart and follow the base or leading squad at about 50 paces. The automatic rifle squad moves in squad column to a position in rear of the base squad and follows the two flank squads at about 50 paces. If the base squad is halted by the platoon leader, the other two rifle and the automatic rifle squads move to the rear if necessary to gain their positions.

3. *In squad columns with one rifle squad back.*—At the command, *SQUAD COLUMNS, CENTER (OR DESIGNATED) RIFLE SQUAD BACK,* the other two rifle squads move in squad column to the right and left so as to march in the direction indicated by the platoon leader with about 50 paces interval. The center (or designated) rifle squad follows the leading squads in squad column at about 50 paces. The automatic rifle squad follows the center (or designated) rifle squad at about 50 paces. If the leading squads are halted by the platoon leader, the center (or designated) rifle squad and the automatic rifle squad move to the rear if necessary to gain their positions.

From column of threes or fours the center rifle squad is usually designated as the forward or rear squad. In other dispositions, the squad most conveniently located may be designated.

To deploy the platoon as skirmishers.—The command is: *AS SKIRMISHERS.* The squads move out as indicated for squad columns and deploy as skirmishers at the command of the squad leader as they reach their positions.

To deploy as skirmishers with one rifle squad forward (or back), the command is: *AS SKIRMISHERS, CENTER (OR OTHER) SQUAD FORWARD (OR BACK).* The squads move out as indicated above (squad columns with one rifle squad forward) deploying as skirmishers as they reach their positions.

To deploy the squads as skirmishers.—The platoon being in squad columns, the platoon leader may deploy the squads as skirmishers by commanding: *AS SKIRMISHERS.* At this signal or command the squads deploy, retaining their relative positions within the platoon.

To assemble the platoon.—To assemble the platoon, the leader signals or commands: *ASSEMBLE,* and points to the place where the assembly is to be made. The platoon assembles in column of threes.

To advance the platoon.—The leader, assisted by the second in command, directs the advance of the platoon. To advance individual squads, the platoon leader signals *FORWARD* to the squad leaders concerned, leaving the method of advance to them, or he may go to the squad leaders concerned or assemble them and give them direct oral orders for their advance. He may send the order by his second in command or by messenger.

To cause the entire platoon to rush, the leader commands: *FOLLOW ME* and springs forward, leading the platoon to the new position.

Antiaircraft deployment.—Being in column of threes, the automatic rifle squad in rear, at the command, *PLANE (S) FRONT (RIGHT, LEFT,* or *REAR),* the right squad moves to the right at top speed. The leading and rear men of the right squad go about 10 paces and the center man about 50 paces. Other men of the right squad go to such distances that when halted the squad forms a rough semicircle. The left squad moves to the left in the same way. The men of the center squad take interval between the right and left squads, odd-numbered men to the left and even-numbered men to the right. The automatic rifle squad deploys to the right and left of the road by teams.

In deployments against air attack, men upon halting assume the

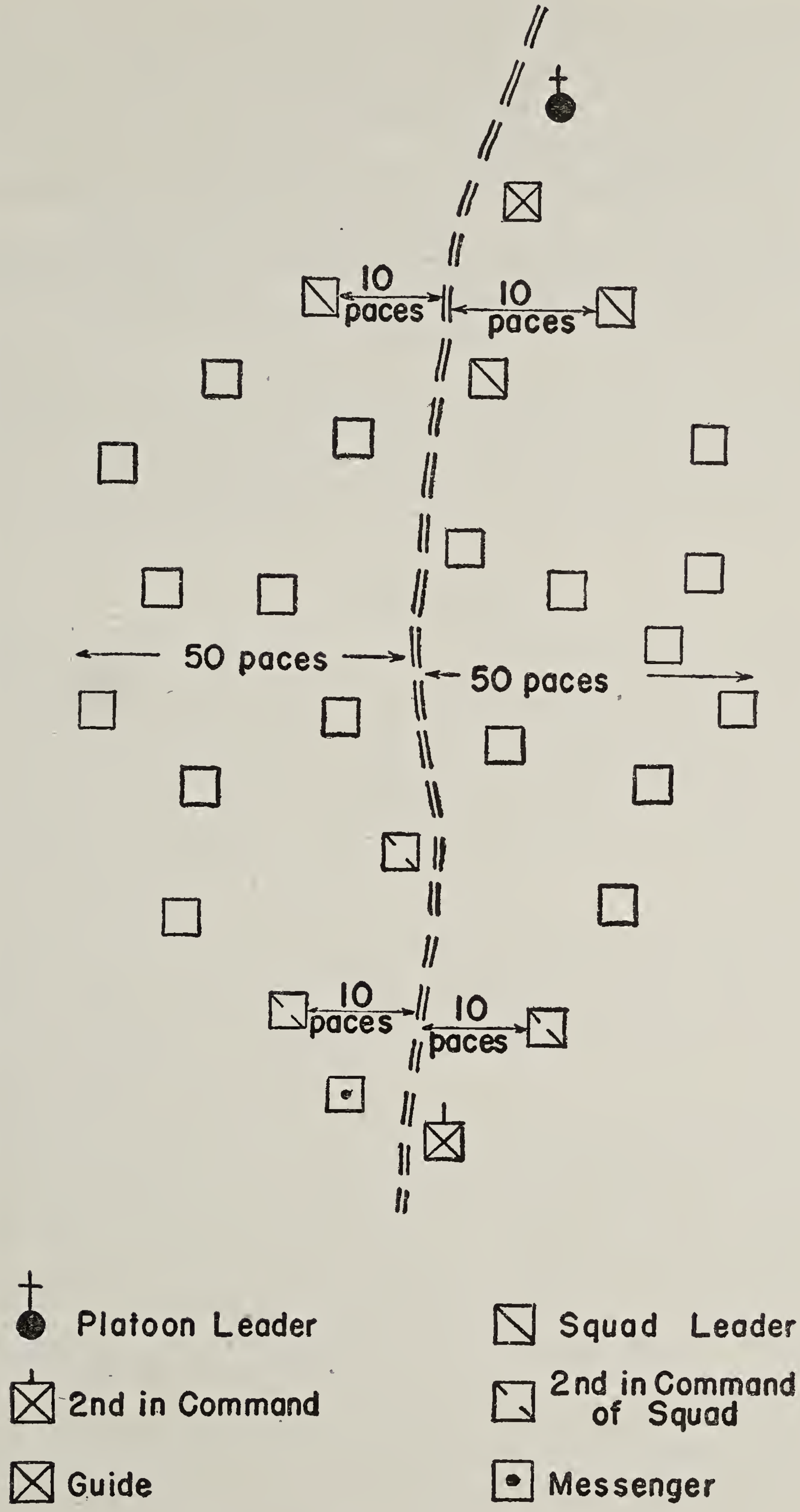


FIGURE 15-6.—Platoon antiaircraft deployment.

antiaircraft firing position facing the approaching airplanes. Being deployed to meet an air attack, if it is desired to continue the march without assembling on the road, squad columns are formed and the march continued off the road.

In a four-squad unit marching in column of fours, the same method is used. The two center squads deploy to the right and left.

In column of twos the same method is used, the right column deploying to the right and left column deploying to the left.

CHAPTER 16

Scouting and Patrolling

Scouts, either individually or formed into patrols, are used to gather information vital to the security and movement of a unit of ground troops. A patrol is a detachment of troops sent out from a larger body for reconnaissance or security. Scouts and patrols must be carefully trained in observation, movement and concealment, and must be able to operate by day or night over all kinds of terrain. They frequently must operate within enemy positions, and they must be able to accomplish their mission and return without casualties.

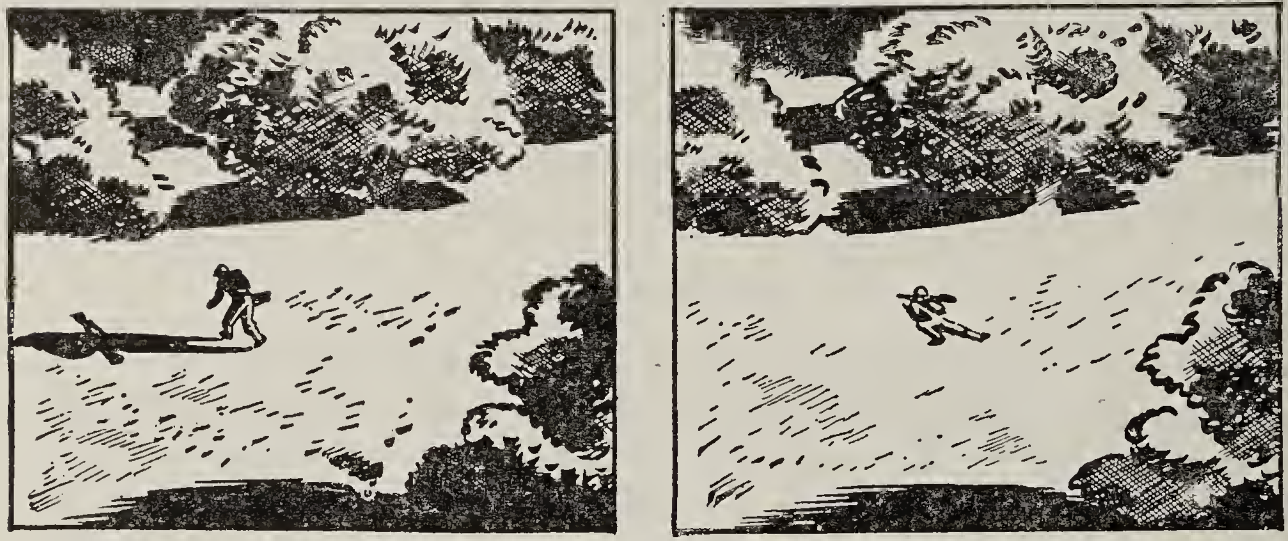
SCOUTING

The principal duty of a scout is reconnaissance, which is the securing of information concerning the position, movements, strength and condition of the enemy. A well-trained scout must have full knowledge of maps and map reading; composition, relay and reading of messages; and concealment. A scout must also develop the ability to estimate enemy troop organization and strength. Information on maps is included in chapter 17.

A scout must be as careful in returning to his own lines as in starting out, in order to avoid enemy patrols and the fire of friendly sentries. When near enemy lines a scout may return enemy fire *only* to avoid capture. If capture is unavoidable, all maps, papers and insignia should be destroyed.

Scouting by day.—A scout should always act as though he were being observed by the enemy. He should make the fullest possible use of terrain features and other aids to concealment. In open spaces and in the presence of the enemy, a scout should pick out his route, determine places probably occupied by the enemy, and select his next stopping place when moving by rushes from cover to cover. Before occupying a selected position, a scout must observe closely for a long enough time to be sure that it is not occupied. Frequently the enemy will give away his position by some slight movement. A scout should move his head slowly and steadily when observing from any position. The prone position will afford the best concealment in most terrain, although trees, buildings and other terrain features may permit observation from a standing position.

When observing from inside a building, a scout should stand back from doors and windows and remain in shadow as much as possible. When he climbs a tree he should choose one with a background to avoid being silhouetted against the sky. When observing from any position, the nearest terrain should be searched first, since his greatest danger from the enemy is there. Terrain should be searched by sections in parallel overlapping strips.



Wrong—The shadow cast when the sun is low helps the enemy to see you.

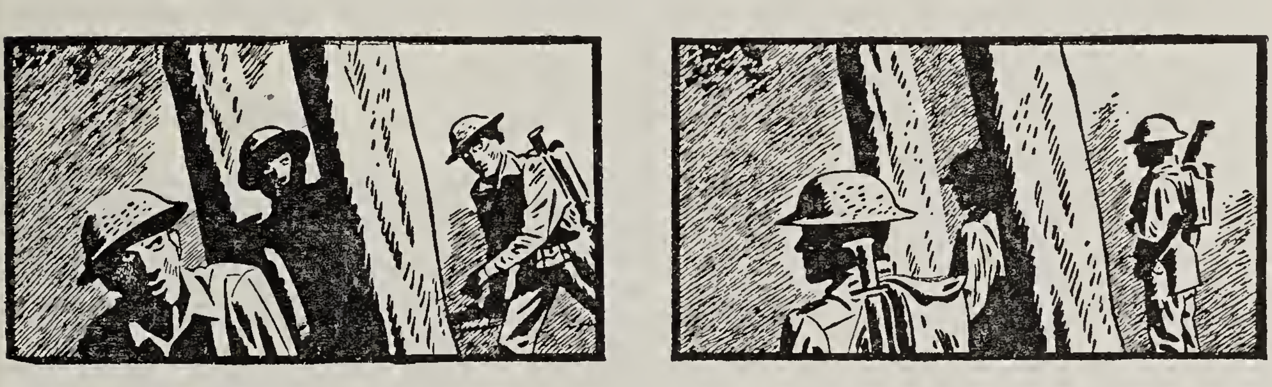
Right—Avoid casting a shadow by keeping close to the ground.

FIGURE 16-1

To avoid detection, a scout stays as close to the ground as possible when moving from one place to another. When crawling along the ground, advantage should be taken of slight rises or shallow dips in the terrain. The body rests on the forearms, with the buttocks down at all times. The knees are always kept behind the buttocks, *never* under them. Many casualties are suffered by men who neglect this rule. In crawling, the right leg is drawn up to push the body along, while rising slightly on the forearms. To cross an open space by rushing, the scout springs up, runs at top speed with the body bent low, and then drops and remains motionless until ready to move again. A zigzag course will give some protection when under enemy fire. Where it is necessary to cross an open space at slow speed, keeping close to the ground will avoid the casting of a revealing shadow.

Scouting by night.—Scouting by night differs from scouting by day in that sound rather than sight is to be guarded against. The best time for reconnaissance is on dark and stormy nights. The best time for rapid movement is during shelling, heavy gusts of wind or distant firing. All sounds must be studied carefully to determine the presence of the enemy. The best method to detect the sound of men walking is to hold the ear close to the ground.

A night scout should avoid making any noise. When walking on soft ground, he should lower each foot heel first, then slowly shift the weight to the ball of the foot. On hard ground, the toe is placed first and then the heel carefully lowered. When walking through grass, each foot should be raised above the grass and then lowered, heel first, as on soft ground. Crawling is done at night in the same way as by day except that before each movement a scout should feel the ground ahead for branches and other objects which may make a noise. A threatened sneeze is stopped by pressing upward against the nostrils with the fingers. A threatened cough is stopped by slight pressure on the Adam's apple.



Wrong—If you look up in the light of a flare, you will be seen.

Right—In the light of a flare, freeze in position.

Figure 16-2

The presence of enemy flares indicates that the enemy is doing little or no patrolling. Never look at a flare, as it will cause temporary blindness. If a flare is heard leaving its distributor, a scout should drop to the ground before the burst and remain motionless. If caught in the light of a bursting flare, he should freeze in position immediately. When observing at night, objects may blur because of concentrating too long. When this occurs the eyes should be closed for a few seconds and then opened slowly.

PATROLLING

Patrols perform two principal missions: they secure information about the enemy and limit enemy reconnaissance. Patrols may also be assigned combat duty when covering the movement of other troops. The strength and composition of patrols is determined by the mission, terrain, range of operation and the probable number of messages to be relayed. Where information is to be gained by stealth, small patrols are detailed and carry only light arms and equipment. Strong, heavily armed patrols are used for operations at a considerable distance from friendly troops or where concealment is not possible. When reports are to be sent back, patrols must include men detailed as messengers.

The character of the reconnaissance to be made and the nature of the hostile screen to be penetrated are also important factors in determining the strength and composition of patrols. Where an attack is to be made against an enemy entrenched in a strong defensive position, a thorough reconnaissance must be made. The enemy's main positions, the locations of his flanks, the character of terrain, and the nature of hostile field works must all be known in the greatest possible detail. Defensive patrols afford protection from surprise attack by continuous reconnaissance.

Patrolling by day.—When patrolling by day, ordinary oral com mands are used where silence is not necessary. If silence is necessary, oral commands are passed from one man to another, or simple prearranged signals and infantry arm signals are used. All members of the patrol must know all signals in order to maintain communication and proper control. When members of a patrol are spread out, each man must look frequently to the next man for signals. Advances from one covered position to another are generally made by rushes. The patrol leader determines the rate and direction of movement and transmits the governing signals to his men.

Patrolling by night.—Night patrols usually discard helmets and bayonet scabbards. If they are to return before daylight they seldom carry rations or extra clothing. Strict discipline as to talking or whispering must be maintained. Control signals should be as much as possible like common night sounds and only loud enough to convey messages. The primary use of signals is to control the movement of the patrol and check for missing members. In an emergency any member may give signals. The man who stops the patrol by signal must be the one to start it again. Members of a night patrol must fully understand all plans, orders, instructions and signals before starting.

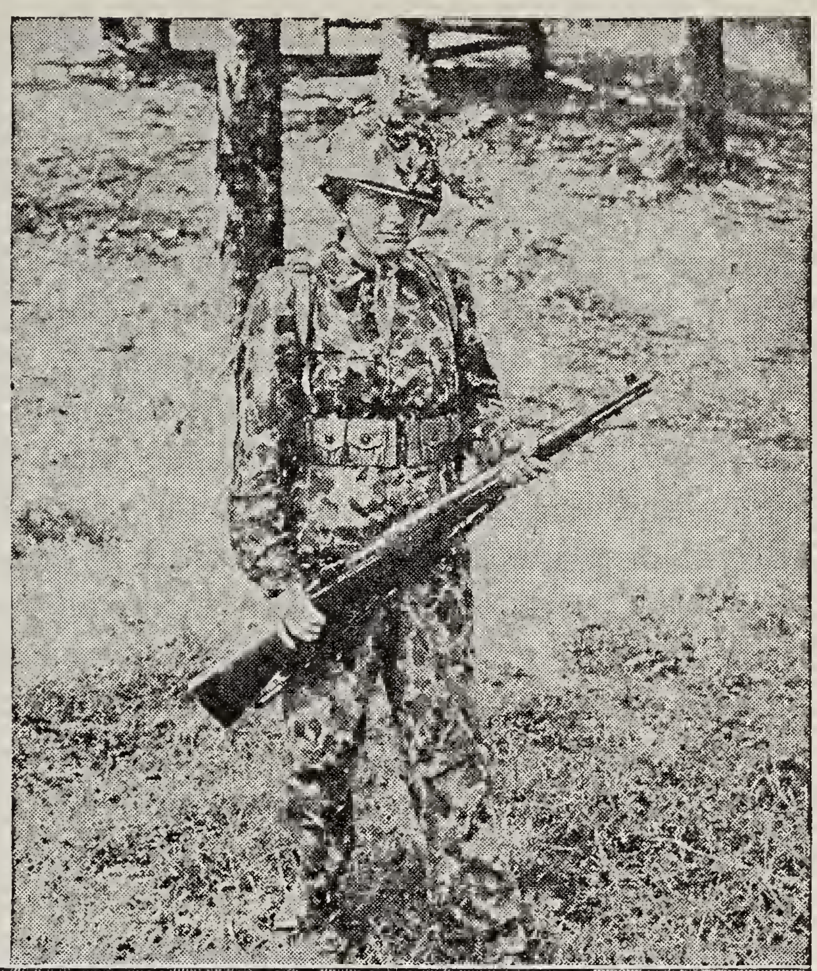
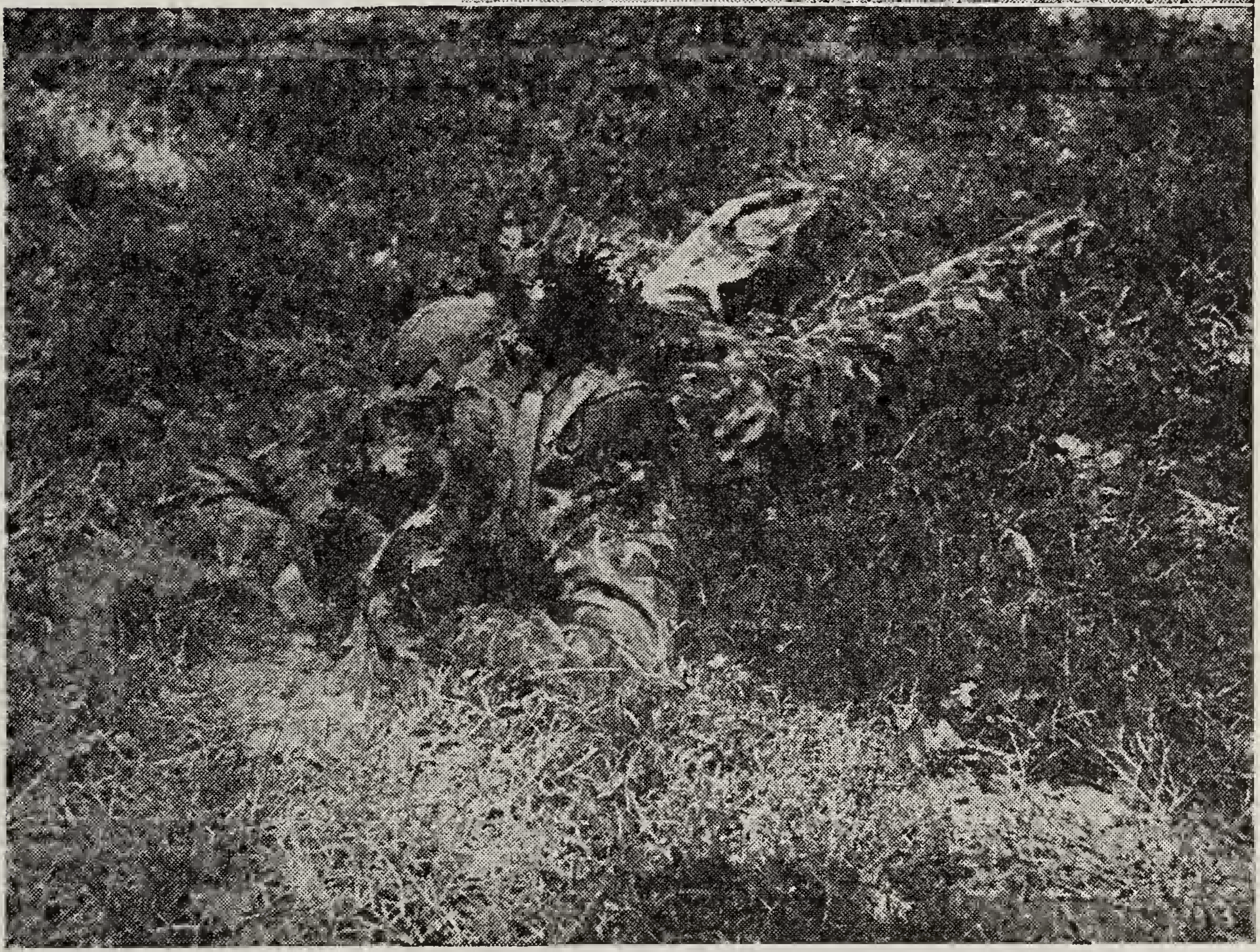


FIGURE 16-3

Camouflage is effective only when blended with a similar background. In these illustrations, the standing figure is conspicuous. But, lying prone, the camouflage blends with the light and shadows of the grass, concealing the individual effectively.



CAMOUFLAGE

Camouflage includes any and all methods of concealment from enemy observation. Materials used in camouflage are classified as natural or artificial. Natural concealment is afforded by terrain features, branches, leaves, brush or earth. Artificial materials include paint, nets and special camouflage clothing. Natural and artificial materials may be freely mixed together.

The basic principle of all camouflage is to cause the individual to blend with his background. Since most backgrounds are dark in color and irregular in pattern, the camouflage should be the same. Bright or glistening articles should be kept hidden or be blackened with dirt, soot or paint. The face and hands should be darkened with earth or grease paint. Since movement is easily detected, scouts should remain motionless when halted. The silhouette of a man is clearly visible against the sky; therefore, ridges and skylines must be avoided. Men are least visible when in shadow. A man's own shadow is clearly visible from the air. When following a road, a scout should walk so that his shadow falls off the road onto irregular ground or into brush. When aircraft appear suddenly, a scout should remain motionless in position, keeping the face down and hands covered. Particular care must be taken to avoid exposing anything white, such as written messages or maps. Great care should be exercised in lighting matches at night, as the light from a single match can be seen from great distances.

MESSAGES

An important part of scouting and patrolling is prompt relaying of accurate information to the commanding officer. Messages may be sent orally, in writing, or by prearranged signals. When there is danger of interception, written messages must not include information of value to the enemy. Oral messages or messages by signals are sent when writing is impracticable or when the message contains only one simple idea. All messages are numbered in sequence for each mission or patrol. Written messages must show the hour, date, and location. In concluding a message, the writer should state his intended action; for example, "Will continue on mission," or "Will remain in observation." A written message should be read and checked carefully before sending, preferably by another man. Messages should be signed with official designation, surname and rank, or with special prearranged identification. One messenger is sufficient to deliver a message where there is no danger of interception. In enemy territory, two messengers may go together or may carry the same message by different routes. The number of messages sent may depend on the size of the patrol and how many men can be spared. When there is doubt that the previous message reached its destination, the following message or messages should contain a summary of previous information.

CHAPTER 17

Marches and Military Maps

CONDUCT OF THE MARCH

Preparations and formation.—Before a march is undertaken, the officer in command will issue orders and directions covering the following points: objective and destination of the march, troop distribution, march order of the main body, general and special security measures, starting point, and the time at which the head of the first unit will clear the starting point. If possible, troops will prepare all gear and fill canteens the night before. At this time the sick and physically unfit will be cared for or eliminated from the ranks. The usual march formation is the route column of threes or fours. The commander and headquarters unit will normally march at the head of the main body both in peaceful and hostile areas. The most suitable time to start a day's march is one hour after daybreak. There should be a minimum delay in starting after men fall in to avoid fatigue from standing.

Distances and halts.—The maximum distance for unseasoned troops for the first day's march is from 6 to 8 miles. This may be increased each day at the rate of one or two miles to the maximum for seasoned troops. A small body of troops can ordinarily march greater distances than large bodies. A normal day's march for large forces is 10 to 12 miles.

The first halt should be made about a half hour after starting and should be of 15 minutes' duration. This allows the men to get their second wind, adjust shoe laces, arrange packs, and to attend to calls of nature. Thereafter, 10-minute halts should be made every hour. The normal length of the noon halt is 1 hour. In hot climates, a cool, shady place should be selected for the noon halt. All halts should be planned in advance and made by the clock. All troops should know the length of the halt in order to take full advantage of it. Insofar as practicable, men should remain in column during halts.

Food required during a day's march should be prepared before starting and carried by each man, in order to avoid long halts. At the end of a day's march, field kitchens should be set up immediately and a hot meal should be served as soon as possible.

INDIVIDUAL CARE

The conduct of the march is determined by the officer in command and may be varied only at his discretion. However, there are other items of discipline and care which are the responsibility of the individual.

Care of the feet.—This is the most important factor in individual marching ability. In the field, properly fitted regulation shoes should be worn. They must be broken in properly. Broad laces should be used; shoes should be laced tight enough to hold the heel in place and prevent the foot from shifting in the shoe. Woolen socks, free from holes and darns, should always be worn. They should be large enough to allow free movement of the toes, but not large enough to permit wrinkling. At the end of a day's march, socks should be changed and washed. If washing is impossible, change each sock to the opposite foot. After a long march, wash feet with soap and cool water, but do not soak them. Always dry carefully between the toes. Inspect the feet before and after a day's march and take care of any injuries, no matter how slight. Dust the feet with foot powder until they become hardened. Keep toenails short and clean. Cut the nails straight across.

Blisters in particular must be cared for. The lower part of a blister should be punctured with a sterilized needle and drained with gauze. After the blister has been drained, dust the loose skin with foot powder and use adhesive tape to keep the skin in place. However, do not cover the hole through which the blister drains. To prevent the formation of blisters, red or sore areas of the feet should be covered with adhesive tape.

Water.—Individual discipline in drinking water is particularly important on long marches in hot climates. Under average conditions, the first drink of water should not be taken until after 2 hours of marching. From then on water should be taken at one-hour intervals. Water should always be sipped slowly. About one pint of water should be taken with each meal. Too much water will cause excessive perspiration and fatigue. Since it induces thirst, smoking should be limited to rest periods. If there is any question regarding the purity of water found along the march, it should be purified by boiling or by the use of tablets issued for the purpose.

SECURITY ON THE MARCH

The number and composition of guards and security patrols will be determined by the nature of the terrain and the strength and composition of enemy interference. Patrols are normally sent out by the advance party to reconnoiter to the front and flanks. Their normal strength is from 2 to 6 men, one of whom is detailed as get-away man to return with information to the advance party if the patrol is seriously engaged by the enemy. Any information about the enemy must be sent immediately to the leading column by messenger or signal. After a patrol has completed its mission, it should rejoin the nearest element of the march column and then proceed to its own element.

Advance guards.—An advance guard is a security detachment that goes ahead of and protects the main body of the force marching toward the enemy. The advance guard covers the deployment of the main body for action when contact is made. The principal tasks of an advance guard are to insure uninterrupted advance, to protect against surprise, and to secure information by reconnaissance to the front and flank. In accomplishing these tasks, an advance guard should remove obstacles or road blocks, repair bridges, drive back small enemy units attempting to delay the main body, and seize suitable commanding positions when the main body is halted.

The four subdivisions of an advance guard are the point, advance party, support and reserve. The size of the main force determines the size of the advance guard; the larger the force, the longer it takes to prepare for action. The mission, size of elements, terrain, visibility and the proximity and strength of the enemy determine the distance to be maintained between the elements of the advance guard.

Rear guards.—Rear guards protect the rear of a march or of a force in retreat. The principal tasks of a rear guard are to relieve the main body of engaging in action, to insure the uninterrupted movement of the main body, and to protect the main body against surprise attack and enemy reconnaissance. A rear guard should maintain contact with the enemy, destroy bridges and roads and erect obstacles. A rear guard should fight a delaying action from suitable positions where necessary, but should normally avoid becoming seriously involved in the event of a withdrawal. However, if necessary, it is the duty of the rear guard to sacrifice itself in order to allow the main body to get away.

Flank guards.—Flank guards cover the flanks of the main body of troops to prevent the enemy from bringing effective flanking fire. Flank guards march abreast of and approximately parallel to the line of march, securing positions from which the enemy might make a flank attack before the main body comes abreast of these positions. New positions are occupied successively and held until the main body has passed. Each detachment of the flank guard then rejoins the main body. Since they cover much greater distances than the main body in the same or shorter time, flank guards must be highly mobile. Flank guards must also maintain communication with the main body at all times. This is normally done by two-man patrols sent out from the main body.

Outposts.—When the main body is halted or deployed for defense, outposts are established for security. Outposts permit the main body to rest and keep it furnished with information about the enemy. They prevent enemy reconnaissance and delay enemy attack. The elements of an outpost are the outguards, the supports and the reserves. The outpost of a small command is usually relieved daily.

MILITARY MAPS

Maps are used by all military land forces in the planning and execution of any operation. Knowledge of maps is particularly important for scouts and patrols, engineers and artillery units. Besides being able to read and interpret maps, it is valuable for all hands to be able to make simple sketches of terrain and work with overlays.

Terrain features and symbols.—Terrain features must be recognized quickly and named correctly since they are used in most reports, orders and messages. It is also necessary to know the symbols for these features and be able to use them. Terrain features are commonly classed as natural and artificial. Natural features include hill, peak, range, crest, gentle slope, deep slope, valley, draw, ravine, saddle, cliff, woods, river, stream, right and left banks. Artificial features include house, bridge, railroad cut, fill, road, crossroad, clearing, field, ruins, buildings in general, telegraph or telephone lines, fences, landing field, trenches, barriers.

Map directions.—All maps show the direction of the true or geographic North Pole by a marginal line with a star at the north end. Except in certain localities, magnetic north will vary from true north and will be indicated by a marginal line with half an arrowhead at the north end. Magnetic north is the direction of the magnetic North Pole. The needle of a magnetic compass will point to magnetic north when unaffected by local attraction. Declination is the angle between magnetic and true north and is given in degrees east or west of true north. The azimuth of any line drawn on a map or of any direction on the ground is the angle measured clockwise from north. If measured from true north, it is called a true azimuth; if measured from magnetic north, it is called a magnetic azimuth.

Orientation of maps.—A map is said to be oriented when it is held level and when lines on the map are parallel to corresponding lines on the ground. Four common methods of orienting a map are: by compass, by two known points, by watch and sun, and by the North Star. To orient a map by compass, place the compass on the map with its north-south line on the north-south line of the map and then turn the map and compass until the needle points north along the north-south line on the map. To orient a map by two known points, draw a fine line on the map between the two known points, stand at one of these points and sight along the line, turning the map until the other point is sighted. To orient a map by watch and sun in middle latitudes of the Northern Hemisphere between 0600 and 1800, set your watch to approximate sun time for your longitude, hold the watch horizontally face up, and point the hour hand toward the sun. The line dividing the smallest angle between the hour and 12 o'clock will point south. After this direction is determined, pick out an object on the terrain along this line with

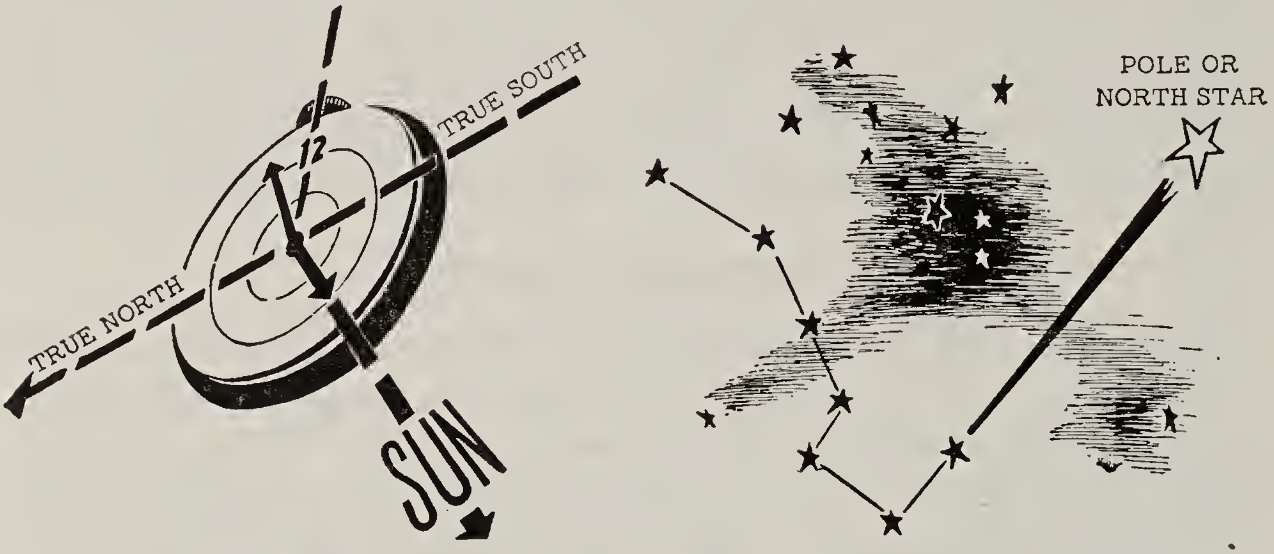


Figure 17-1.—How to find true north using a watch and the sun and using the North Star.

the eye at the north end of the map, sighting along the north-south line; then turn the map until the object is sighted. To orient a map by the North Star, place the eye at the south end of the map and turn it until the south-north line points to the North Star. Figure 17-1 shows how the North Star may be found by using as guides or pointers the two end stars in the Big Dipper.

Map distances.—The ratio of any horizontal distance on the map to the corresponding horizontal distance on the ground is called the scale of the map. Scales are expressed by words and figures, graphic scale, and representative fractions. If stated in words and figures, as "3 inches equals 1 mile," this means that 3 inches on the map is equal to 1 mile on the ground. A graphic scale is shown in a box drawn on the map divided into sections representing distances on the ground. Scale by representative fractions gives the direct ratio between distances on the map and on the ground; for example, 1:20,000 means that one inch or one foot on the map corresponds to 20,000 inches or feet on the ground. When laying out or measuring distances on a map, a strip of paper may be marked out at the proper scale and used as a ruler.

Elevations.—Elevation is the height of any point on the map given either from mean sea level or from some other established datum. Elevations may be accurately shown by contour lines or

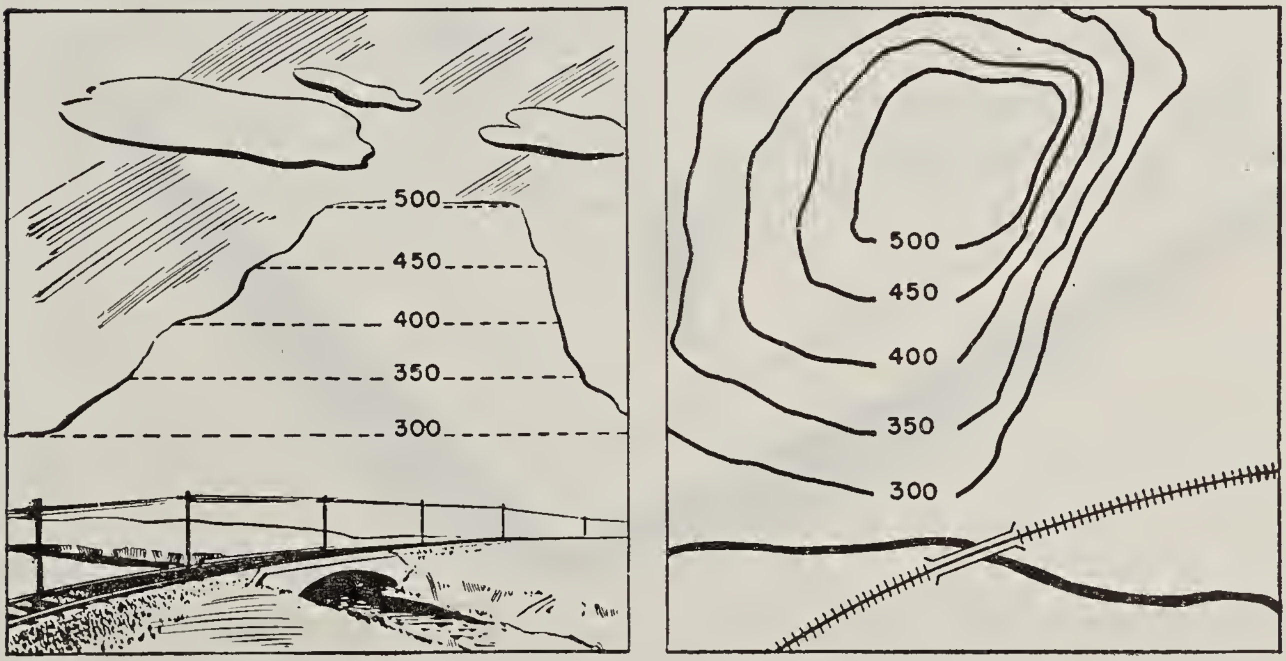


FIGURE 17-2.—The picture on the left is shown as a map on the right. Lines, labeled to show height above sea level, indicate the hill. Where these lines, called *contour lines*, are closest together the hill is steepest. The map also shows the railroad, the bridge, and the stream by means of map symbols.

indicated by hachure lines which have the effect of shading the high points. The elevation of any particular point, such as the top of a hill, may be given by a simple numeral placed in the correct position on the map. Contours are lines of equal elevation and are marked by numerals inserted in broken spaces along the contours. Thus, any point on a 100-foot contour is at the elevation of 100 feet above sea level. Contour lines may be used to construct a profile of any line or direction on the map. This is of value in determining visibility, in ground observation, for protection from enemy fire (defilade), and for laying out trails, roads and march routes.

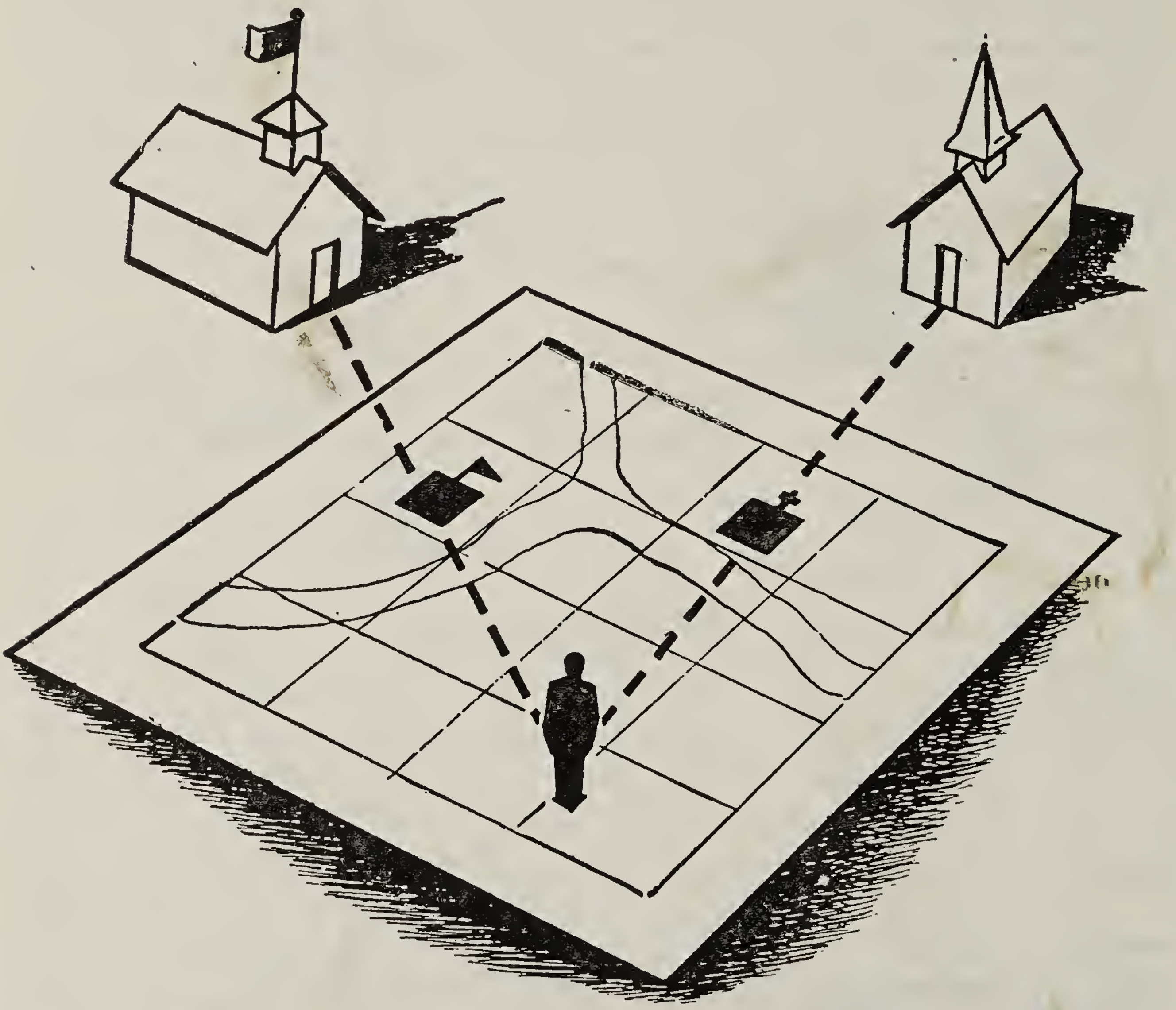


Figure 17-3.—How a map and visible landmarks tell you where you are.

Determining map position.—When one or two known points on a map are visible on the ground, your own position may be determined readily. First orient the map carefully by compass. If only one known point is visible, sight across the map toward the point along a ruler or straightedge and draw a straight line through the point on the map. Your position is somewhere on this line, and may be determined by measuring or estimating the horizontal distance between you and the visible known point on the ground and laying off this distance to scale along the line on the map. If two known points are visible, draw lines from each toward your position. The intersection of the two lines on the map indicates your position. Your position may be checked by measuring on the ground and scaling on the map the distance from each visible point.

Your position on the map may be determined without a compass if you are standing on a road, river bank, ridge, along a telegraph line, etc. First orient the map by means of the road, bank, etc., and then select some visible point on the ground which can be identified on the map. A line drawn through this point to your position (as above) will intersect the road, bank, etc., at the point where you are standing.

Your position on the map may also be determined without a compass when three visible points on the ground can be identified on the map. This is done by using a transparent paper or overlay. Make a mark on the near edge to indicate your own position. Sight toward each visible point successively and draw lines from your mark without moving the paper. Place the overlay on the map and adjust its position so that each line on the overlay passes through the point on the map which represents the corresponding visible point on the ground. Then prick the map at the point where the three lines on the overlay intersect. To check position, the map should then be oriented from any one point and the direction and distance to the other points determined.

PART 3

SHIPS AND AIRCRAFT

CHAPTER 18

Construction and Equipment of Ships

NAUTICAL WORDS AND PHRASES

To understand ship construction and duties afloat, you must learn Navy language and get in the habit of using it. Nautical terms not explained in the text will be found in the glossary at the end of the book. With a little practice the words are easily remembered, especially if they are associated with visible parts of a typical Navy ship or with everyday activities afloat.

You do not get on to a ship; you go *aboard.* The head of the ship is the *bow,* not the front end or sharp end. The rear end is the *stern.* When you stand at the center of the ship and face the bow, you face *forward;* if you turn around you face *aft.* Facing forward, the right side of the ship is the *starboard* side; the left side is the *port* side. An imaginary line from bow to stern is the *centerline;* it runs *fore-and-aft;* the length of this line is the *length* of the ship. The greatest width of the ship is the *beam.*

An object directly off the side of your ship is *abeam.* An object or line running directly across the ship, like a passageway or deck beam, is *athwartships.* When you stand at the center of the ship you are *amidships.* When you face either side, you face *outboard.* Your shipmate at the rail who looks back at you is facing *inboard.* An object over your head is *above;* an object underneath you is *below.*

The floors of a ship are always *decks;* the walls are always *bulkheads;* stairs are always *ladders.* There are no halls and corridors in your ship; only *passageways.* There is no ceiling in your room; only the *overhead* of your *compartment.* Openings in the outside of the ship are *ports,* not windows. Other openings in decks and bulkheads are *hatches.*

In rough weather you don't shut the windows and lock the doors; you *close the ports* and *dog the hatches.* A picture is never nailed to the wall; it is *secured* to the *bulkhead.* You don't mop the floor; you *swab the deck.* The smoke from the ship's boilers comes out of a *stack,* not a chimney.

You never get out of bed in the morning and go to work; you *hit* *the deck* and *turn to*. Even if it is part of your job, you will never be requested to run downstairs to the kitchen and turn on the stove; you may get an *order* to *lay below on the double* and *light off* the *galley range*.

DEFINITION OF "SHIP" AND "BOAT"

The word *ship* is a general term for any large floating vessel which moves through the water under its own power. Fighting ships are simply self-propelled floating gun platforms, designed to move guns and other weapons to the scene of battle. Transports and cargo ships are designed to load, move and unload men and materials. Since the war is being fought all over the world, Navy ships must be able to travel over all the oceans in any kind of weather.

A *boat* is essentially the same as a ship, only smaller. There is no absolute distinction between the two, since they both float and carry loads of men, weapons and material. The most common definition is that a boat is any vessel small enough to be hoisted and carried aboard a ship. Another usual difference is that a ship can cross a large ocean under its own power, while a boat cannot. For these reasons, the 77′ Motor Torpedo Boats (PT) are classed as boats, while the 110′ Submarine Chasers (SC) are classed as ships. Just remember that a destroyer is a *ship*, while the Admiral's gig is a *boat.*

CONSTRUCTION OF HULLS

The *hull* is the main body of the ship below the weather deck. The term does not include the superstructure above the weather deck. The hull must keep the water out in order for the ship to float. It consists of an outside covering, or skin, and an inside structural framework to which the skin is fastened. In almost all types of Navy ships, both the framework and the skin are made of steel. The steel skin is called the *shell plating.* The parts of the hull are usually fastened together by welding, although riveting is still used to some extent.

An *unarmored hull* is one which has been designed and built to withstand only the pressures and strains encountered by a fully loaded ship in the heaviest seas, with some added structural strength for protection in case the ship runs aground.

An *armored hull* has extra layers and thicknesses of steel plating to protect the vital parts of the ship from damage by enemy shells, bombs and torpedoes.

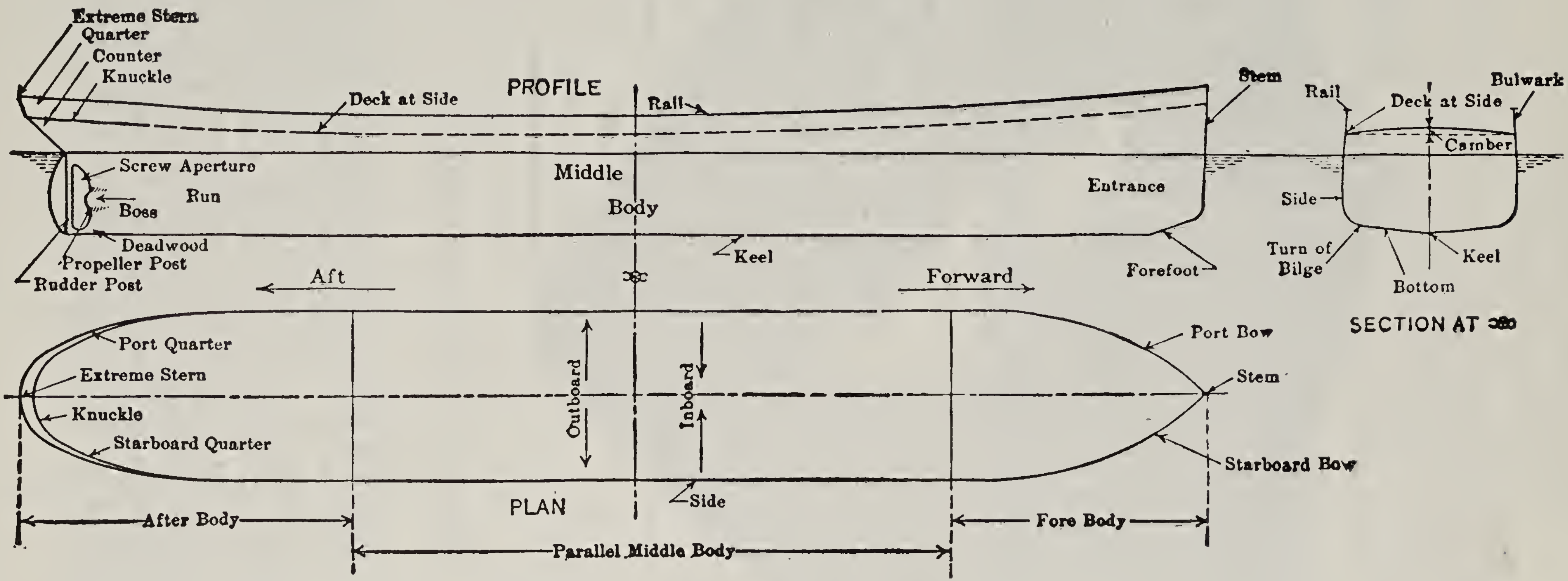


FIGURE 18-1.—Parts of a ship.
(Courtesy of McGraw-Hill Book Co.)

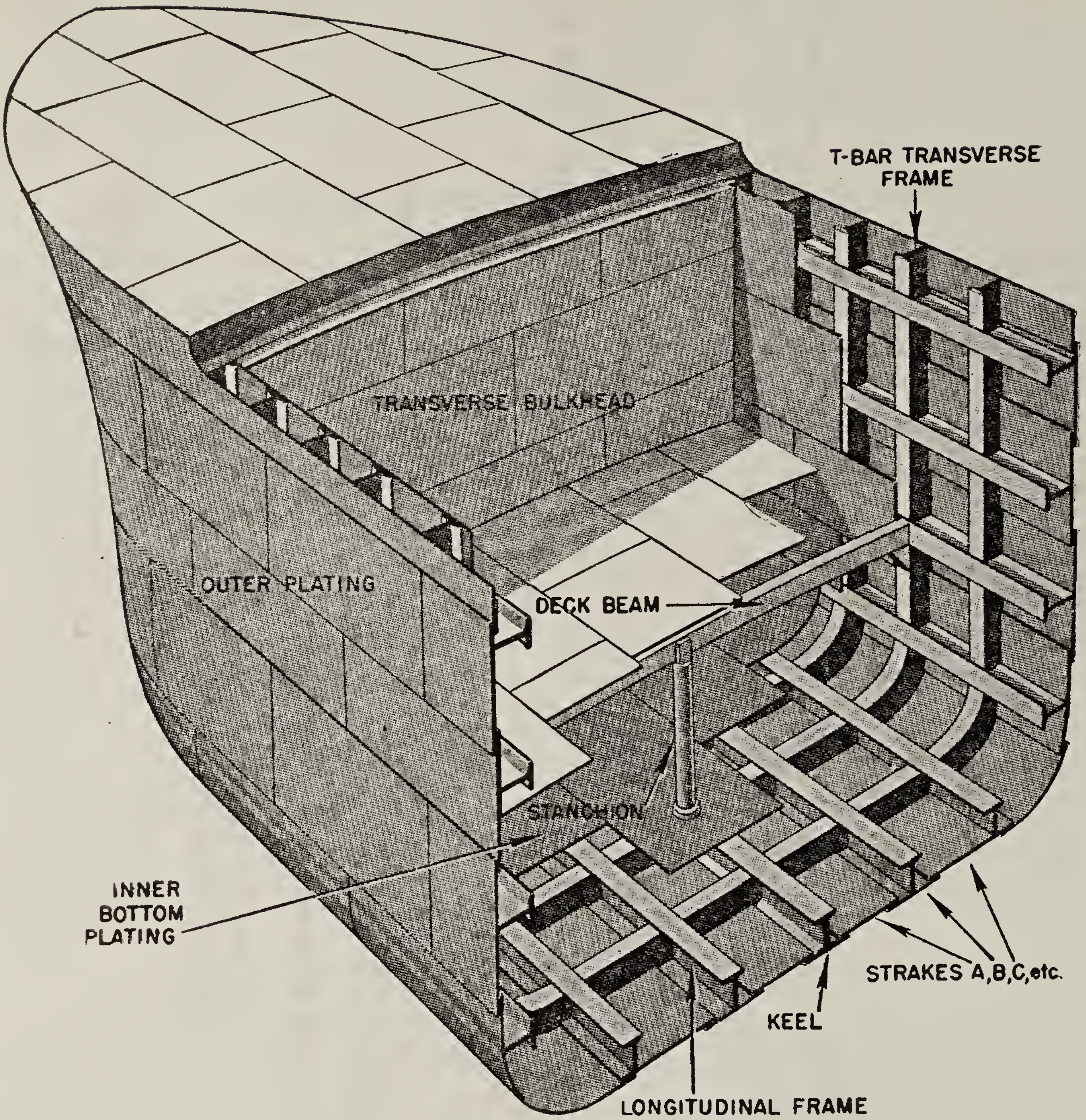


FIGURE 18-2.—Construction of hulls.

The principal structural part of the hull is the *keel,* which runs from the *stem,* at the bow of the ship, to the *sternpost* at the stern. To the keel are fastened the *frames,* which run athwartships and support the shell plating. To support the decks and resist the pressure of the water on the sides of the hull, *bulkheads, deck beams* and *stanchions* are joined together and fastened to the frames. The system of interlocking steel bulkheads and decks of a warship furnishes a large part of the whole strength of the hull.

NAMES OF DECKS

The *decks* of a ship are the horizontal divisions which correspond in function to the floors of a building. Together with fore-and-aft and athwartships bulkheads they subdivide the inside of the hull into spaces for living quarters, machinery, armament, storage and other uses. The system of naming decks is the same in most types of Navy ships; you should be familiar with these names.

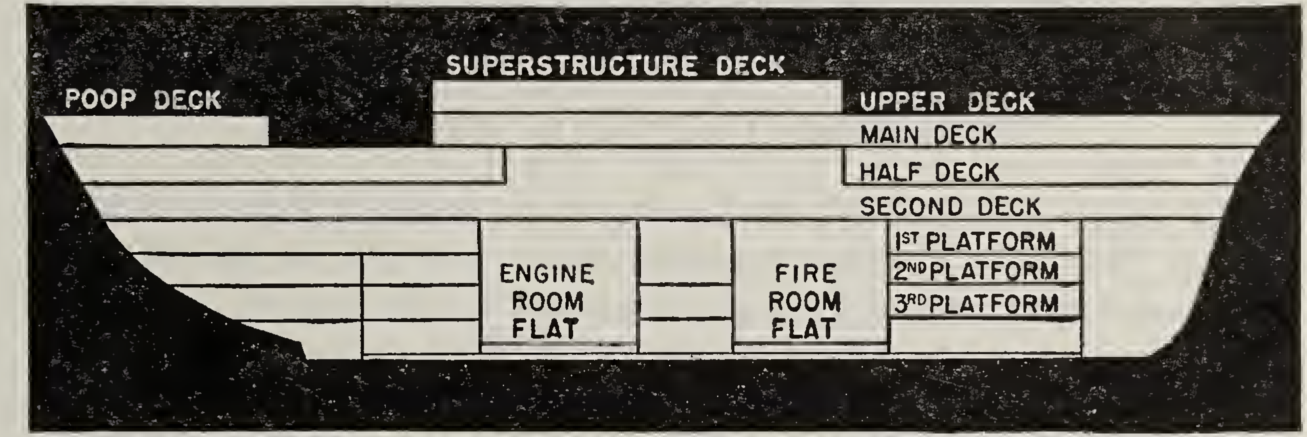


FIGURE 18-3.—Decks of a ship.

The *main deck* is the highest deck which extends over the entire ship from stem to stern.

The *second deck, third deck, fourth deck,* etc., are other complete decks below the main deck, numbered in sequence from topside down.

A part deck above the main deck is named according to its position on the ship; at the bow it is called a *forecastle deck;* amidships it is called an *upper deck;* at the stern it is called a *poop deck.*

The term *weather deck* includes all parts of the main, forecastle, upper and poop decks which are exposed to the weather.

The *quarter deck* is not a structural part of the ship, but is a location on or below the main deck, designated by the commanding officer as the place for masts and ceremonies.

A part deck anywhere between the *main deck* and the lowest complete deck is called a *half deck.*

A part deck below the lowest complete deck is called a *platform deck.*

Decks which are armor-plated for protection are called *protective* and *splinter* decks in addition to their regular names. If there is only one, it is called protective; if there are two, the heavier one is the protective deck and the lighter one is the splinter deck.

Any deck above the main, upper, forecastle, or poop decks is called a *superstructure deck.*

Special names for decks are used aboard special ships. The top deck of an aircraft carrier is the *flight deck;* other decks of carriers are named in accordance with the layout of the ship. You will find, however, that the names given above will apply to battleships, cruisers, destroyers, and most auxiliary ships.

EXTERIOR PARTS OF THE HULL

Certain words and phrases apply to the action of the hull in the water. The line to which the water rises on a hull is the *waterline.* The vertical distance from the waterline to the lowest edge of the weather deck is the *freeboard.* The vertical distance from the waterline to the lowest part of the ship's bottom is the *draft.* You may also think of the draft as the least depth of water in which the ship will float. The waterline, freeboard and draft will, of course, vary with the weight of the load carried by the ship.

The draft is measured in feet, and numbered scales are painted on the sides of the ship at both bow and stern. The relation between the drafts at the bow and the stern is the *trim.* When the ship is properly balanced fore-and-aft, she is "in trim." When the ship is "out of trim," because of damage or unequal loading, she is said to be "down by the head," or "down by the stern." When the ship is out of balance laterally or athwartships, she has a *list;* she is said to be "listing to starboard" or "listing to port." Both trim and list are adjusted by emptying or filling tanks and compartments in various parts of the hull.

Other words and phrases apply to locations or parts of the hull. The part of the bow structure above the waterline is the *prow,* although this word is not used as generally as the terms "bow" and "stem." The part of the weather deck nearest the stem is called the *eyes* of the ship. The general area of the weather deck in the forward part of the ship is the *forecastle,* even though the ship may not have a forecastle deck. The edges of the weather deck from bow to stern are usually guarded by removable light cables and stanchions called *life lines,* or by extensions of the shell plating above the deck edge, called *bulwarks.* The deck area at the stern of the ship is the *fantail.* The part of the stern which literally hangs over the water is the *overhang.* The flat part of the bottom of a ship is called the *bilge.*

The curved section where the bottom meets the side is called the *turn of the bilge.*

Below the waterline are the *propellers* or *screws* which drive the ship through the water, and the *rudder* which steers the ship. The propellers are attached to the ends of *propeller shafts* and are turned by them. Ships with only one propeller are called *single screw;* ships with two propellers are *twin screw.* Ships with more than two propellers, usually four, are called *multiple screw.* In twin or multiple screw ships, the exposed length of propeller shafts is so great that they must be supported by braces extending from the hull, called *propeller braces.* Because of the shape of the hull at the stern, the screws may be damaged when she is close by a pier. To prevent this, metal frames called *propeller guards* are built out from the hull above the water.

COMPARTMENTATION AND TANKS

If the interior of the hull of a fighting ship were all one space, a single large hole, made by an enemy shell or torpedo below the waterline, would quickly cause the ship to flood and sink. To prevent this, the interior of the ship is divided by bulkheads and decks into watertight compartments. The term *watertight integrity* is used to cover the maintenance and operation of the system of compartmentation when the ship is damaged by battle, fire or collision.

In theory, any large ship could be made virtually unsinkable if it were divided and subdivided into enough small watertight compartments. From a practical standpoint there is a limit, since compartmentation interferes with the arrangement of mechanical equipment and with the operation of the ship. Enginerooms must be large enough to accommodate bulky machinery, and obviously cannot be subdivided to the extent that is practical in some other parts of the ship. Despite practical limitations, however, a modern capital ship has extensive compartmentation and is very difficult to sink. The German battleship *Bismarck* stayed afloat for many hours of terrific pounding by British bombs, shells and torpedoes because of its elaborate system of watertight compartmentation.

All compartments aboard ship are numbered from forward aft. Compartments on the starboard side of the ship have odd numbers; those on the port side have even numbers. The number of any compartment locates the exact position in the ship, vertically by decks, and fore and aft by transverse bulkheads.

Large ships have an outer and inner bottom, often called *double bottoms.* These are divided into many compartments. In armored hulls the inner bottom may turn up at the turn of the bilge to form an inner side, with similar compartmentation. Many of the compartments aboard ship are used as tanks for fuel oil storage, fresh water or for trimming ship. Tanks at the extreme bow and stern, used for trimming ship fore and aft, are called *peak tanks.* A heavy watertight bulkhead just abaft the forward peak tank is called the *collision bulkhead.* All compartments and tanks have pump and drain connections for pumping out seawater and for transferring fuel or water from one part of the ship to another.

Most watertight bulkheads and decks must have many openings to permit the circulation of piping, ducts and electric or communication lines; to allow men to move around the ship; and to permit the transfer of equipment from one part of the ship to another. Scuttles and hatches which must be closed to maintain watertight integrity are provided with watertight covers and doors. These are generally hinged and fitted with heavy gaskets; they are secured by *dogs* which wedge them against the opening; some are arranged so they slide shut and wedge themselves.

When setting up dogs on watertight doors and hatches, a dog on the opposite side from the hinges should first be set up with sufficient pressure to hold the door or hatch closed. Two dogs should then be set up snugly on the hinge side, after which all the dogs should be set up evenly to insure a bearing all around. When loosening dogs on watertight doors or hatches, those dogs nearest the hinges should be loosened first. This prevents the door from springing and makes it easier to operate the remaining dogs.

Proper organization and discipline in the closing of watertight doors and hatches plays a vital part in the control of battle or other damage. Gear and devices for securing watertight integrity must be

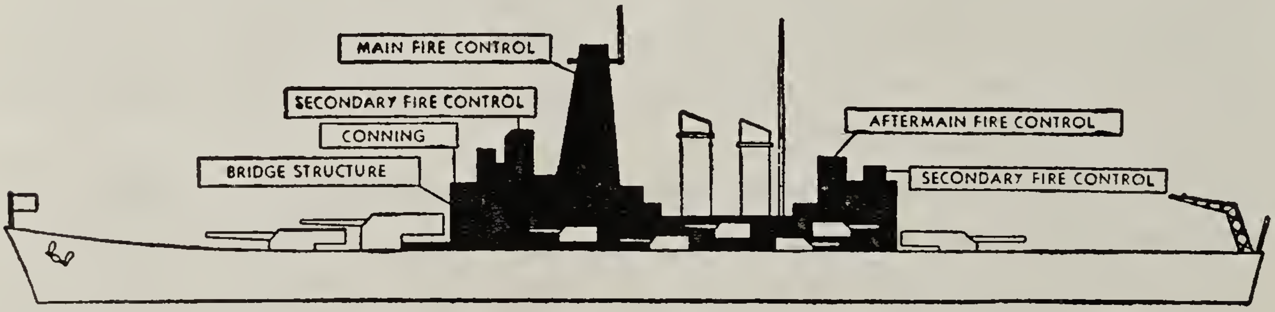


FIGURE 18-4.—Superstructure of a typical battleship.

kept in top-notch condition. Lack of vigilance has caused the loss of ships through the unnecessary flooding of compartments.

SUPERSTRUCTURE

Superstructure may be defined as everything that is on the ship above the weather deck. There is a great deal of variation in the layout of superstructure on different types of Navy ships, but the same principal elements will be found aboard all of them in one form or another. Peacetime ocean liners devote a large part of their superstructure to living quarters and recreation facilities. Unlike them, practically all of the superstructure of a fighting ship is made up of actual armament and controls necessary for operating the ship. There is a high prominent structure well forward on destroyers and nearly amidships on our new battleships. This structure consists of deckhouses, platforms, ladders and spaces for enclosing gun, ship and fire control equipment.

The size of this assembly varies from the tall massive structure on a battleship to the small wheelhouse or pilothouse on the smallest ships. Regardless of the size, however, these structures all serve the same purpose—that of providing an adequate housing for the "nerve center" of the ship. Within this network of decks, compartments and ladders are the instruments and personnel for the control of the ship, for communication with other parts of the ship and with other ships, and for the control of gunfire. A major part of this assembly on all ships is the *bridge*, the station of the officer commanding the ship.

A *conning tower*, located just forward of and slightly below the bridge, is a distinctive feature of battleships and cruisers. It is a heavily-armored structure containing duplicates of all the control apparatus found on the bridge. As the primary ship control station during action, it is the battle station of the Captain. In addition to this conning tower, some ships have a *battle bridge*, an open platform nearby for the use of the commanding officer during engagements with enemy aircraft.

Each battleship and cruiser has a *fire control tower*, either a separate structure just aft of the conning tower or actually an integral part of that structure. It contains equipment for the control of gunfire and is the battle station of the gunnery officer.

Located near the bridge is another open platform called the *signal bridge*, from which signalmen maintain visual communication with other ships in the vicinity. A radio room, quickly available to the commanding officer, is also located in the bridge assembly.

ORDNANCE

Although technically not part of a ship's superstructure, her turrets, gun houses, gun mounts, fire control apparatus, torpedo tubes and other ordnance equipment play such an important part in the function of a ship and occupy so much of the available space topside that they may be included under the general term superstructure.

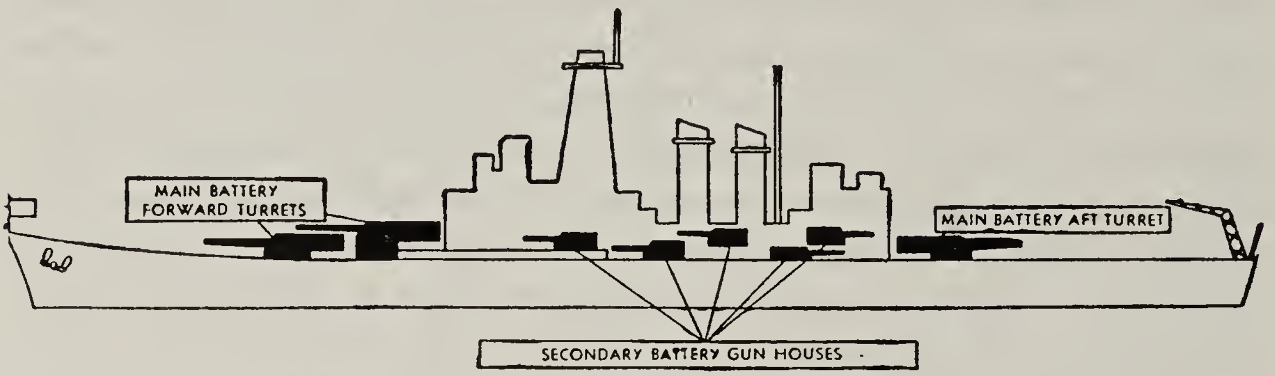


Figure 18-5.—Turrets and gun houses of a typical battleship.

Turrets are found only in armored ships such as battleships and cruisers. They consist essentially of a heavily armored box topside containing up to four main battery guns and a structure extending downward through the decks containing the ammunition-handling rooms and hoists. The entire structure rotates within a heavily armored cylinder called a *barbette,* extending from the armored upper part of the turret down to the lowest armored deck. Thus the gun crews and ammunition are protected from enemy shell fire.

Gun houses are also revolving, box-shaped structures. On many small ships they are used to house the major guns; on larger ships they contain the secondary battery. Though they frequently look like turrets, they are not heavily armored and their handling rooms are not protected by barbettes. The plating is intended only as a protection from light splinters and heavy seas. On a battleship or cruiser the gun houses are mounted along each side amidships. On destroyers, four or five gun houses are arranged fore and aft along the center line. Latest practice is to mount either one or two 5-inch dual-purpose guns in each house.

A large number of guns are not mounted in turrets or gun houses. Almost all light anti-aircraft guns, such as the .50 caliber, 20 mm. and 40 mm. automatics, are of this type. There is no specified location for these smaller guns; they are placed wherever they can be of the best service and wherever there is room.

Fire control apparatus is the equipment used to control a ship's gunfire. The more intricate devices are below decks in a protected position, but much of the equipment must necessarily be topside. On the larger ships with heavy masts, some of this equipment may be located in the foretop or maintop and some on separate towers built up from the superstructure. On a destroyer, however, the *gun director* is housed on top of the superstructure bridge assembly. This director can usually be readily identified by the cylindrical ends of the optical *range finder* extending outboard from the sides of the house.

Torpedo tube mounts on a modern destroyer are usually located amidships on the center line. They consist of four or five tubes fitted with breech mechanisms and can revolve to launch torpedoes on either side of the ship. Some old cruisers have torpedo tubes on the main deck aft, while older destroyers have them mounted on the port and starboard sides amidships.

Destroyers and patrol craft are equipped with *depth charges* for anti-submarine action. Usually these can be dropped over the stern by rolling them from inclined racks on the fantail. In addition, most ships have mortar-like *y-guns* or *k-guns* secured to the decks fairly well aft, by means of which the "cans" can be projected outboard by firing charges of black powder.

MASTS AND STACKS

In heavy modern fighting ships there is a tendency for the masts to be included as part of the main superstructure assembly. However, on older ships and on the smaller types of escort and patrol craft, masts are still a distinct feature of the superstructure. Navy ships have either one or two masts. If there are two, the forward one is the *foremast* and the other is the *mainmast.* On single masted ships the mast is amidships or forward, is usually part of the main superstructure assembly, and is called the foremast or simply the mast.

Masts vary greatly in size and shape, some being built of several structural steel members and others being a single steel or wooden

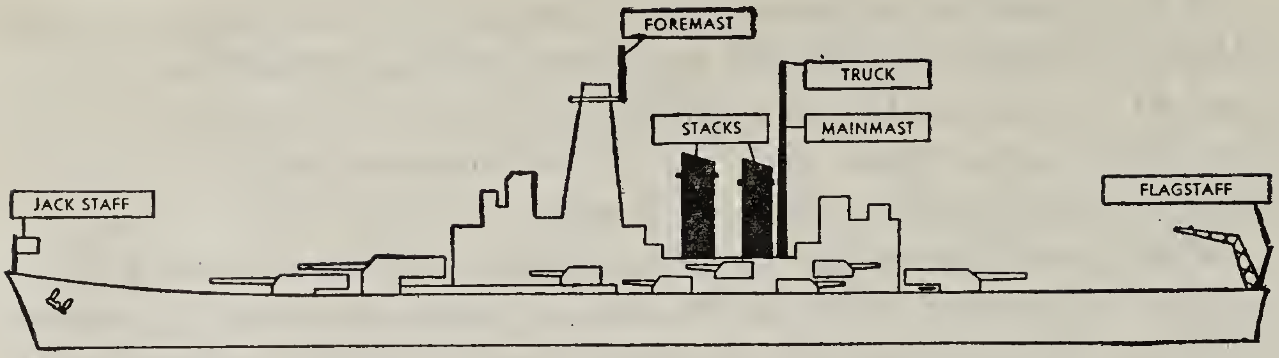


FIGURE 18-6.—Masts and stacks of a typical battleship.

pole. On all ships, at least one mast, together with a spar running athwartships called a *yard*, is used for flags and other signal devices. These must be rigged in such a way as to be visible from other ships. The lighter types of masts are supported by *standing rigging*, consisting of wire rope *stays* running fore-and-aft and *shrouds* running athwartships down to the deck or bulwarks.

The small cap usually found at the top of a pole mast or flagstaff is called a *truck*. Loosely speaking, the top of any mast is also called the *truck*. Above the truck there is frequently a slender vertical extension of the mast called a *pigstick*. Almost every Naval vessel has a pigstick on the mainmast, from which the *commission pennant* or an admiral's *personal flag* is flown. Extending abaft the mainmast of a Naval vessel is a small spar known as the *gaff*. The national ensign is flown from the top or peak of the gaff when the ship is underway.

The small vertical spars at the bow and stern of a ship are the *jack staff* and *flag staff* respectively. When a Naval vessel is at anchor or moored, it flies the union jack on the jack staff and the national ensign on the flag staff from 0800 to sunset.

Pipes for the expulsion of smoke and gases from the boilers are called *stacks*. There are many different varieties—short, high, vertical, raked, single, double, split trunk, etc. On almost all Naval vessels stacks are located on the center line approximately amidships, a notable exception being aircraft carriers, whose stacks actually protrude from the sides or are located on the "island" at one side of the flight deck. Stacks are a prominent feature of any ship; and their number, type and arrangement are important aids to the correct identification of ships at a distance.

SIGNAL EQUIPMENT

Most of the devices for short range signaling are located on or near the signal bridge. Light lines, called *halyards*, extend from this platform through pulleys on the yardarm. Signal flags, stowed in *flag boxes* on the signal bridge, are "bent on" to halyards and hoisted to the yard. On or near the signal bridge there are *signal searchlights* with manually operated shutters for sending code by flashing light. On the outboard ends of the yard are two small lights, called *yardarm blinkers*, operated by a key on the signal bridge and used for sending blinker messages over short distances. Secured to brackets well up on the mast are two red lights known as *breakdown lights*, which are turned on in case a breakdown endangers ships nearby. Sets of colored lights suspended from the yardarm on halyards or fixed on either side of the bridge structure are *recognition lights* to furnish instant identification of the nationality of a ship at night by a prearranged system of colors. In addition to these signaling devices, there is the *ship's bell*, usually secured to the mast above the signal bridge.

Running lights are those lights aboard ship which are turned on at night during peacetime and which are prescribed by law to be carried by each particular type or class of ship. They are fixed lights consisting principally of a white *masthead light* usually fixed on the upper part of the bridge superstructure or on a small shelf extending forward from the foremast; a white *range light* abaft and above the masthead light either on the foremast or mainmast; and two sidelights, a green one on the starboard side and a red one on the port side. The character and position of the running lights will be covered in detail when the *Rules of the Road* are studied.

THE BRIDGE

The bridge is the main control point and "nerve center" for the whole ship. It is the duty station of the Captain and the Officer of the Deck. All orders and commands come from the bridge while the ship is underway. Large ships have one or more secondary control points containing duplicates of much of the equipment of the bridge itself. At battle stations the Captain and Executive Officer are at separate stations so that if either is put out of commission, the other can take over full control of the ship.

The bridge and all secondary control points are centers for all intercommunications aboard. Systems for interior communication include telephones, both electric and sound powered, voice tubes, alarm systems and special equipment for transmitting engine room orders and for the control of gunfire.

A list of the equipment to be found on the bridge of a modern warship would include: the *wheel* for steering the ship; the *binnacle,* a stand housing the magnetic compass; a *gyro repeater* operated by the gyro-compass; the *engine order telegraph* or *annunciator* for transmitting orders to the engineers; a *fathometer* for measuring the depth of the water by sound waves; a *radio direction finder; switchboards* for operating lights and alarms; and devices for tracking submarines. Navigational equipment such as sextants, charts, draw-

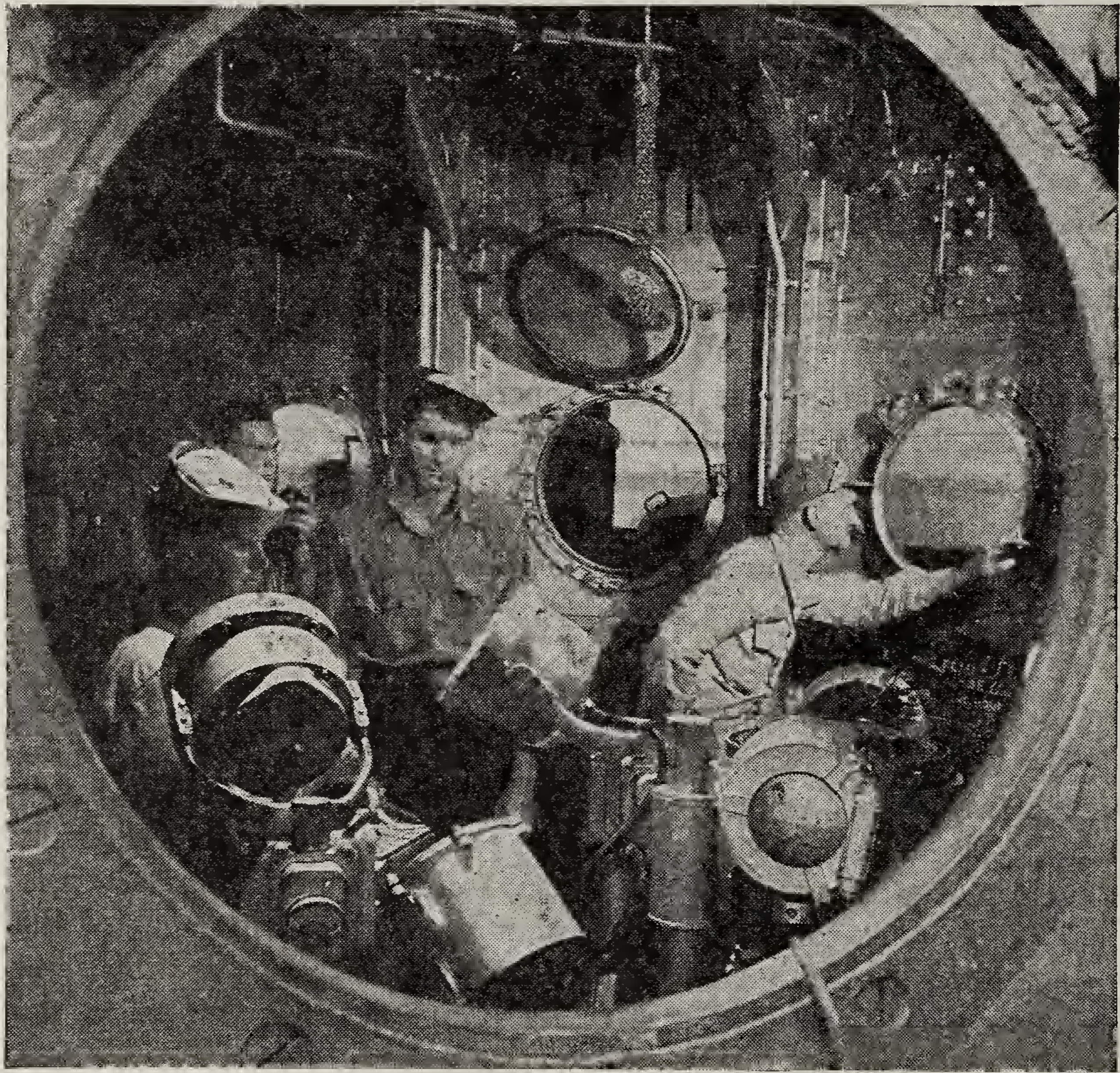


Figure 18-7.—Interior view of the bridge.

ing instruments and reference books may be stowed on the bridge; but more often they are kept in a separate compartment nearby called the *chart house*. Around the enclosed bridge there is usually an open platform where lookouts and the officer in charge may determine the position of other ships, lighthouses, buoys, etc.

MECHANICAL EQUIPMENT

The mechanical equipment and special gear aboard a large modern warship is almost unbelievably complex and no attempt to describe it in detail can be made in this manual. It requires the knowledge and skill of the most highly trained men to understand and operate all this equipment. Some of the principal divisions of mechanical equipment and systems which will be found aboard all ships are as follows:

The ship is driven through the water by *main engines*, which turn the propeller shafts. Most modern ships are driven by high speed, high pressure *steam turbines*. Superheated steam is delivered from the oil burning *boilers* to the turbines at pressures up to 700 pounds per square inch. Steam at these high pressures is extremely dangerous and there are all sorts of devices used for safety and proper control. Power from the high speed turbines is transmitted to the slower turning shafts through reducing gears. There is usually a separate set of boilers and a separate engine for each propeller, and the engine rooms are kept apart as far as practicable so that even if one is damaged the ship can still operate.

The *drainage system* of a ship is a complete system of piping and valves connected with pumps. Its function is to collect and discharge water from the ship, whether this water is waste from normal use, water used in fighting fires, or sea water which has come into the hull because of battle damage, collision or heavy weather. A large pipe in the bottom of the ship, to which the principal branch drains are connected, is called the *main drain*. The *secondary drain* is a pipe of smaller diameter running throughout the length of the ship. The drainage system of a ship includes connections to all the watertight compartments of the hull. Boiler rooms have independent drainage systems and sea valves. Motors and valve controls for boiler room centrifugal pumps are located on higher decks so they can be operated even if the boiler room is submerged.

Parts of the drainage system can be reversed and used to flood compartments when this is required for control of damage.

Since a modern warship has very few ports which would serve to furnish enough natural ventilation for the interior of the ship, a complete *ventilation system,* including air supply, exhaust and air conditioning equipment is installed. Fresh air from the outside is pumped by blowers to all parts of the ship, and used air is similarly exhausted. There is also equipment for heating, drying and removing gas and smoke from the air. A large ship has many independent ventilation systems to keep piercing of watertight bulkheads to a minimum and to protect against the effect of damage and gas attack.

The *fresh water system* furnishes the water required by the ship's personnel and water for the boilers. A large supply is carried in fresh water tanks filled up in port or from water boats, supplemented by water from distillation equipment carried aboard. The *salt water service system* provides salt water for fire protection (including turret sprinkling and magazine flooding), and for flushing. Sometimes the salt water for flushing heads and lavatories and for use in washrooms, galleys and sick bay is drawn directly from the fire main and sometimes from separate lines. The *fire main* is a large pipe running for and aft the length of the ship, to which risers and branch mains are connected. Water in the fire main is normally maintained at a pressure of 100 pounds per square inch.

Other independent systems of a ship include the *fuel oil system* and the *compressed air system.* The fuel oil system includes tanks for the storage of fuel, filling lines, lines to the boilers, and lines and connections for pumping oil from one tank to another. This last operation is important in controlling list and trim when the ship is damaged, and is usually preferable to counterflooding with water. The compressed air system is used for ejecting combustion gases from guns, for testing and blowing out compartments, for charging torpedoes and for the operation of a wide variety of pneumatic tools, dispatch tubes and other equipment.

The number and variety of *auxiliary motors and equipment* required to operate the many mechanical systems of a large warship are almost endless. Literally thousands of motors, compressors, generators, pumps and other pieces of equipment are used. This auxiliary equipment represents a large part of the job of building, operating and maintaining a large fighting ship.

DAMAGE CONTROL SYSTEM

Damage control equipment and gear includes the drainage system, the salt water service system, the fuel oil system, and any and all parts of the fire fighting system and apparatus. Properly speaking, damage control also includes the design and operation of all watertight hatches and doors, as well as material and tools used in shoring bulkheads and making other emergency repairs. The main function of damage control is to keep the ship afloat on an even keel. Therefore proper maintenance and operation of all apparatus which preserves watertight integrity is first in importance.

Most personnel aboard ships are concerned with damage control only when the damage occurs at their individual battle stations. Essentially, each man must know all there is to know about his own as well as adjacent battle stations so that no time will be lost in dealing with emergencies.

When damage occurs which is beyond the control of the men at the scene, repair parties are assigned to the job. Torn or punctured bulkheads may be shored up with timbers, planking, plating, collision mats, and even bedding. Emergency cutting and welding, pipe repairs, electrical repairs, and even major operations on the hull may be undertaken. Thus, a ship's damage control system includes not only the special equipment and gear but also all material and equipment aboard which can be used to keep the ship afloat.

LIVING QUARTERS

A considerable portion of the interior of a warship must be devoted to living spaces and facilities for the ship's complement of officers and men. Quarters and mess facilities for the officers are generally near the bridge. Quarters for the men may be distributed throughout a large ship. Other facilities include the galleys, washrooms and heads, various storerooms and sick bay. On a battleship, the number and variety of facilities is great, while on smaller ships they may be simple. The location, size and arrangement of living quarters is a secondary consideration in the design of a warship. The location of armament, ammunition handling rooms, magazines, boiler rooms and other mechanical elements comes before arrangements for the comfort and convenience of the crew, as battle efficiency must be the primary consideration.

GROUND TACKLE, BOATS AND RAFTS

Much tackle and a number of boats may be carried on deck during peacetime. In war, they interfere with the fighting efficiency of a ship and are reduced to a minimum. Boats are largely replaced by life rafts, and only the most essential non-fighting gear is kept topside. For information on deck fittings and equipment, see chapters 38 and 39.

CHAPTER 19

Types of Navy Ships

ELEMENTS OF SEAPOWER

Purpose of naval force.—Our Navy is a fighting organization designed to engage and defeat our enemies on, over and under all the oceans of the world. Since the oceans are bounded by land, the area of the Navy's fighting may include islands and shorelines which are within reach of ship's guns and ship-based aircraft. The Army does the main fighting on land, but the Army cannot move across to other continents without the Navy. The following statements give an idea of the Navy's fighting job.

1. The Navy protects the over-water transportation of our own and friendly land forces, air forces, supplies and trade. The Navy does this by sinking enemy ships or by shooting down enemy planes which try to interfere with our over-water transportation.
2. The Navy prevents the enemy from using the sea to transport his land forces, air forces, supplies and trade. The Navy does this directly by attacking and sinking enemy naval forces and shipping, and indirectly by mining of enemy waters and destruction of harbors and other facilities.

Use of Naval force.—In accomplishing the above objectives, any or all parts or elements of the Navy may be used. The choice and combination of weapons depends on the nature of the fighting to be done. Naval aircraft, submarines and Marine landing forces should be considered an integral part of the Navy's total strength. Naval force, as opposed to land force or pure air force, is distinguished by its ability to put to sea and fight on the sea for considerable periods of time without touching land. This is a general definition, not an exact one, since total Naval force also includes the harbors and land bases from which Navy ships and aircraft operate. All the *floating forces* of the Navy which take to sea and engage the enemy are included in the term *United States Fleet.*

Elements of the Fleet.—Naval force or strength is built around the fighting ships of the Fleet. These include battleships, cruisers, destroyers, submarines, minelayers, minesweepers, and various types

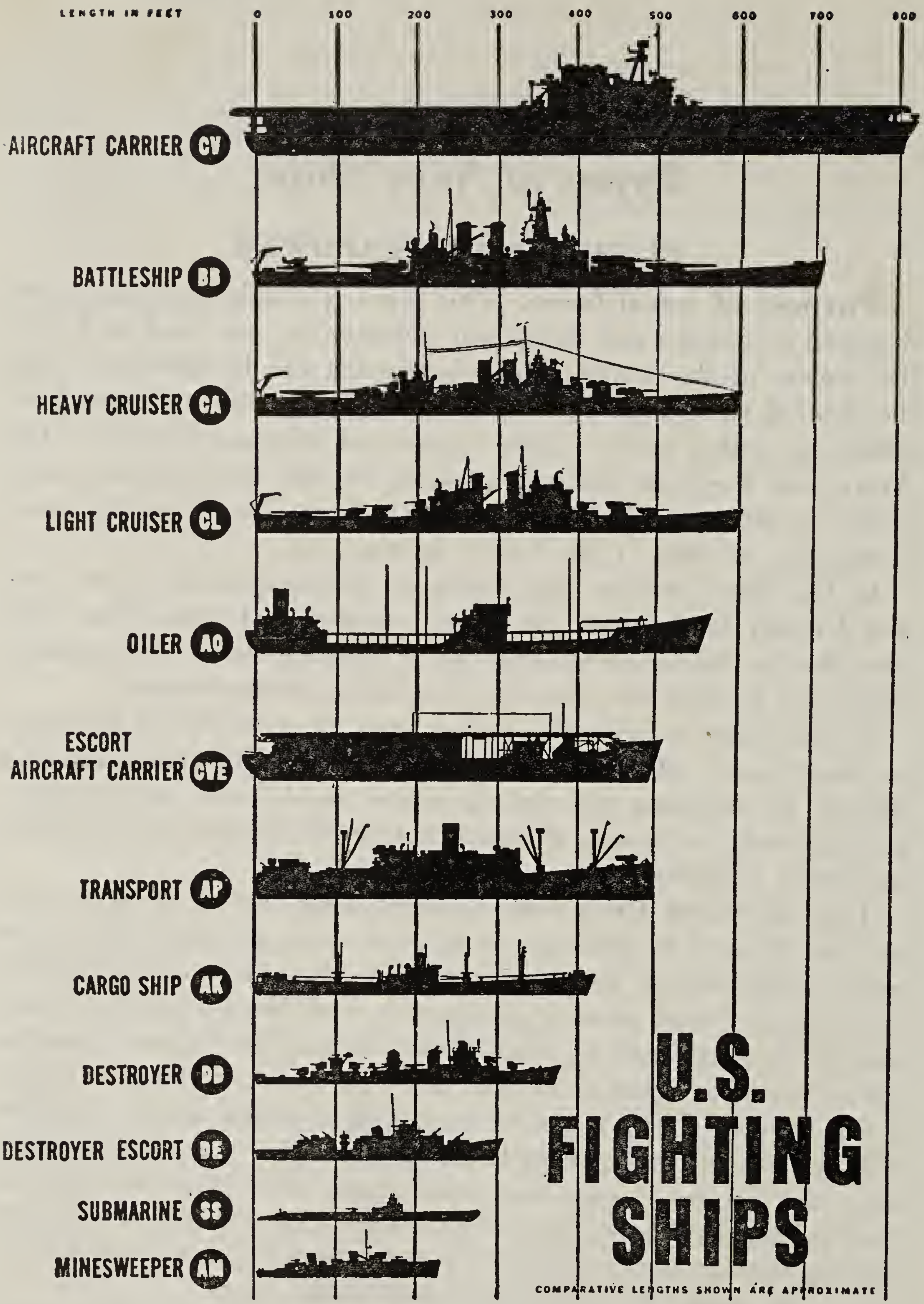


FIGURE 19-1.—Silhouettes of fighting ships of the Navy.

of patrol and escort vessels. Aircraft carriers are in a special class. While they carry many guns and travel with the fighting ships, their primary purpose is to serve as floating airfields and supply depots for Naval aircraft, rather than to fight as ships. On aircraft carriers the many guns are used primarily for defense against enemy aircraft. The heaviest fighting ships of the Fleet are sometimes called the "ships of the line."

In addition to the fighting ships of the Fleet, there are a great many special types of vessel whose function is to provide services and supplies for both Navy ships and Navy shore installations. Such

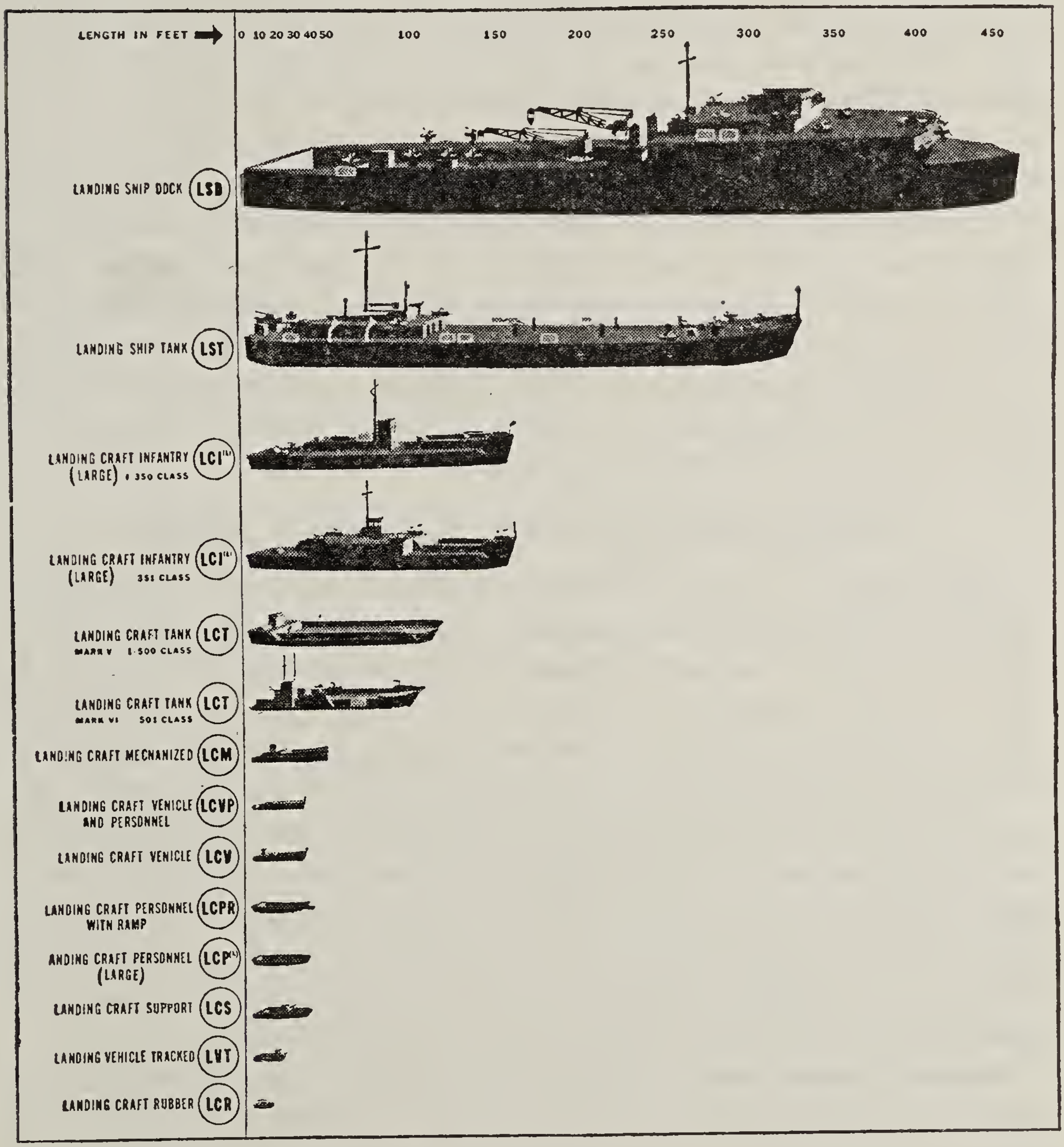

LENGTH IN FEET
0 10 20 30 40 50 100 150 200 250 300 350 400 450
LANDING SHIP DOCK (LSD)
LANDING SHIP TANK (LST)
LANDING CRAFT INFANTRY (LARGE) 350 CLASS (LCI(L))
LANDING CRAFT INFANTRY (LARGE) 351 CLASS (LCI(L))
LANDING CRAFT TANK MARK V 1-500 CLASS (LCT)
LANDING CRAFT TANK MARK VI 501 CLASS (LCT)
LANDING CRAFT MECHANIZED (LCM)
LANDING CRAFT VEHICLE AND PERSONNEL (LCVP)
LANDING CRAFT VEHICLE (LCV)
LANDING CRAFT PERSONNEL WITH RAMP (LCPR)
LANDING CRAFT PERSONNEL (LARGE) (LCP(L))
LANDING CRAFT SUPPORT (LCS)
LANDING VEHICLE TRACKED (LVT)
LANDING CRAFT RUBBER (LCR)

FIGURE 19-2.—Comparative shapes and sizes of landing craft.

ships include cargo vessels, tankers, transports, ammunition ships, repair ships, destroyer tenders, submarine tenders, seaplane tenders, net tenders, hospital ships, tugs and various other special craft. These are all classed as auxiliary ships or "ships of the train."

Fighting ships of the Fleet, supported by auxiliary ships for service and supply, are primarily designed for operations against enemy fleets and shipping. They also are used to bombard enemy ports and shore installations, with or without the assistance of Naval aircraft. Sinking of enemy ships and blockade or destruction of enemy ports is the traditional job of the fighting ships of the Fleet and their auxiliaries.

The large scale amphibious operations of this war have led to the development of another category of Naval ship, classed as landing craft. These are used where large numbers of men and great quantities of equipment and supplies have to be put ashore in enemy territory or where harbors are not available. There are many types of landing craft, from large ships to small boats, built to land anything from a small group of men to the largest and heaviest field artillary, tanks and other equipment. The one common feature of all landing craft is that they are designed to be able to run aground on the beach, unload and get off again. Some special types of landing craft, such as amphibious tractors, cannot be classed as ships, since they operate on both land and water.

CHARACTERISTICS OF FIGHTING SHIPS

Armament.—As stated before, a fighting ship may be thought of primarily as a floating gun platform. A fighting ship may carry other weapons, such as torpedoes, depth charges and mines. An aircraft carrier carries fighter and bomber and scout aircraft. While any means of delivering blows on enemy ships and shore installations is included in the word *armament,* it is proper to use this word primarily with reference to the size and number of guns carried by any individual ship. The battleship represents the highest development of gun armament. It is the heavyweight slugger of the fighting fleet. The nine 16-inch guns of a *North Carolina* or *Iowa* class battleship can fight it out with the strongest enemy ships and can outshoot all but the very largest of shore batteries.

Armor protection.—Besides being able to deal destruction to the enemy, fighting ships must be able to withstand punishment by enemy shells, bombs and torpedoes. So that the ship will be able to "take it," heavy steel armor is placed in various sections to protect its vital parts. The heaviest armor is installed along the waterline near the center of the ship, on main battery turrets, on the conning tower and around barbettes and magazines. The battleship again represents the highest development and use of armor protection. A direct hit by a 500-pound bomb on a forward turret of the *South Dakota* did not even put the turret out of commission. A similar hit on a destroyer would probably sink it. Naturally, only a large ship can carry the weight of heavy armor.

Speed.—The advantage of speed in a fighting ship is obvious. A fast ship can get to the scene of action quickly; it can overtake and engage a fleeing enemy; it is harder for the enemy to hit with either gunfire or torpedoes. Speed alone is also a considerable protection against attack by submarines. High speed in a fighting ship is attained only by great increase in power and fuel consumption. It takes much more than twice the power to increase a ship's speed from 15 to 30 knots. This means that fast ships must devote more of their load-carrying capacity to engines and fuel than slower ships. Modern cruisers and destroyers are capable of very high speeds.

Maneuverability.—This is the quality of ships which enables them to make sharp turns at high speed and to start and stop quickly. It is of great value in dodging enemy bombs and torpedoes and in presenting a difficult target for gunfire. Another important value of maneuverability is in helping a small, lightly armed ship to get in close enough to a larger one to deliver an effective attack. Maneuverability and speed do not necessarily go together. A large aircraft carrier is fast but not highly maneuverable. Perhaps the best example of maneuverability combined with high speed is the motor torpedo boat (PT).

Range.—Radius of action, a quality sometimes called "sea keeping," means the ability of a ship to stay at sea for long periods and to cover great distances without refueling or taking on provisions. "Cruising range" refers to the distance a ship can cover at normal operating (not maximum) speed without refueling. The sea-keeping ability of our fighting ships is very important in the war with Japan, because of the great size of the Pacific Ocean.

Expendability.—Battleships are very expensive; they take a long time to build; they carry a large, highly trained crew. Therefore the sinking of a battleship at sea is a serious military setback. Destroyers, on the other hand, can be built much faster at much less cost. They require smaller crews to operate them. The loss of a destroyer, while unfortunate, is of less importance than the loss of a larger ship. This factor of expendability is an important consideration in designing Navy ships and planning operations. It has a lot to do with the installation of heavy armor protection on battleships and the relative lack of protection on destroyers.

SHIPS OF THE FLEET

Below are described the principal ships of the Fleet, with an example of each. In all classes there are many variations and differences. Many of our older ships have been radically modified since the start of the war, particularly those battleships which were sunk or damaged at Pearl Harbor. Naturally, many of the details of our new ships are restricted information and cannot be described in this manual.

Battleship (BB).—Battleships carry the big guns of the Fleet. They are the heaviest and most difficult to sink of all fighting ships. They are designed to accomplish two major objectives. First, they can engage and sink any and all types of enemy ships by long-range gunfire. Second, they can deliver heavy and continuous bombardment against enemy harbors and shore installations. The nine 16-inch

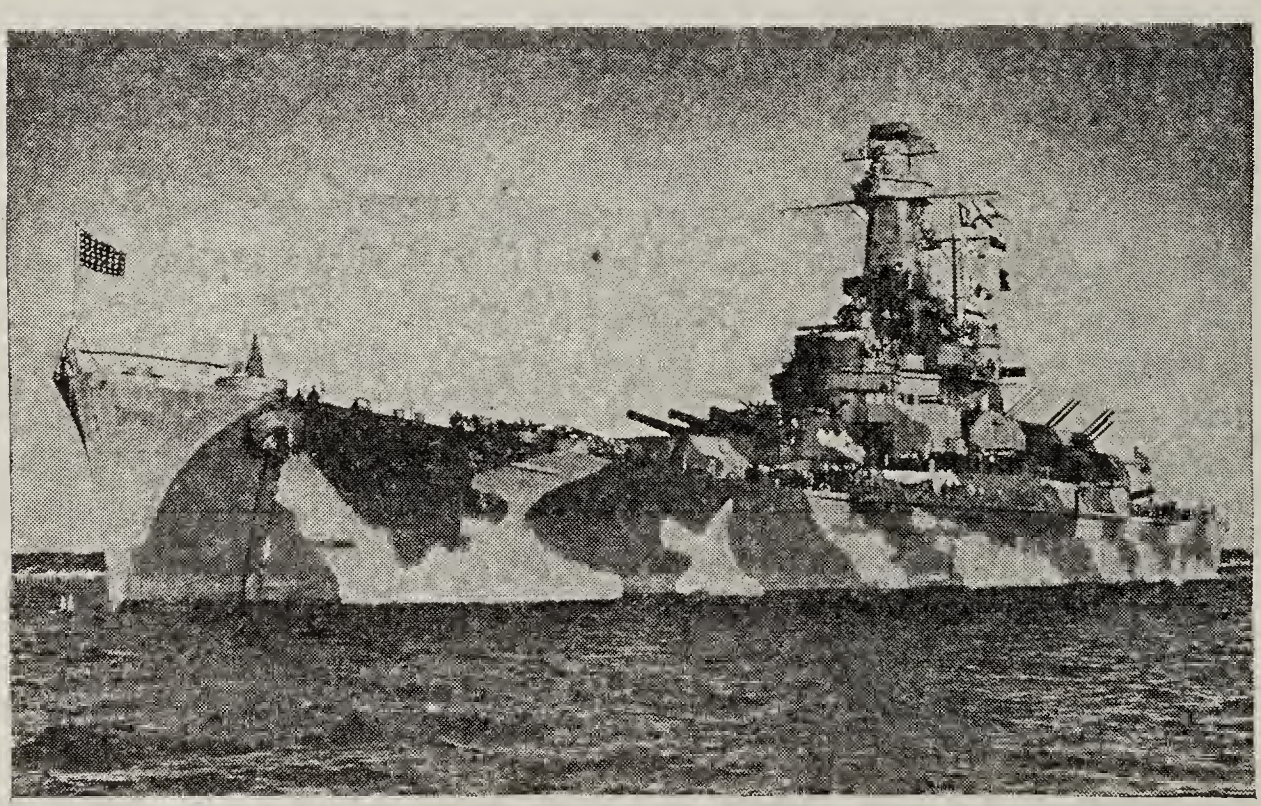


FIGURE 19-3.—A modern battleship.

guns of an *Iowa* or *North Carolina* class battleship can throw accurately in a single broadside more than ten tons of steel and explosive against a target 20 miles away. The terrific hitting power of our battleships has been clearly demonstrated in this war during such engagements as the crippling of the French battleship *Jean Bart* at Casablanca, the Allied landings in Sicily, the battle of Savo Island, the conquest of Kwajalein Atoll in the Marshall Islands, and in numerous other engagements.

While the main battery guns of a battleship can outfight lighter vessels, the battleship is still vulnerable to aerial bombs and torpedoes, and to torpedo attack by submarines and other torpedo-carrying craft. For protection from aerial attack our new battleships carry 20 or more 5″ dual-purpose guns and a great number and variety of smaller anti-aircraft guns, ranging from the 40 mm. twin mount down to .50 caliber machine guns. To limit damage from hits by bombs and shells, battleships are heavily armored, with the heaviest protection along the water line amidships, on turrets and barbettes, on the conning tower and around magazines and main engine rooms. Watertight integrity is maintained by division into many compartments and by duplicate control and pumping systems.

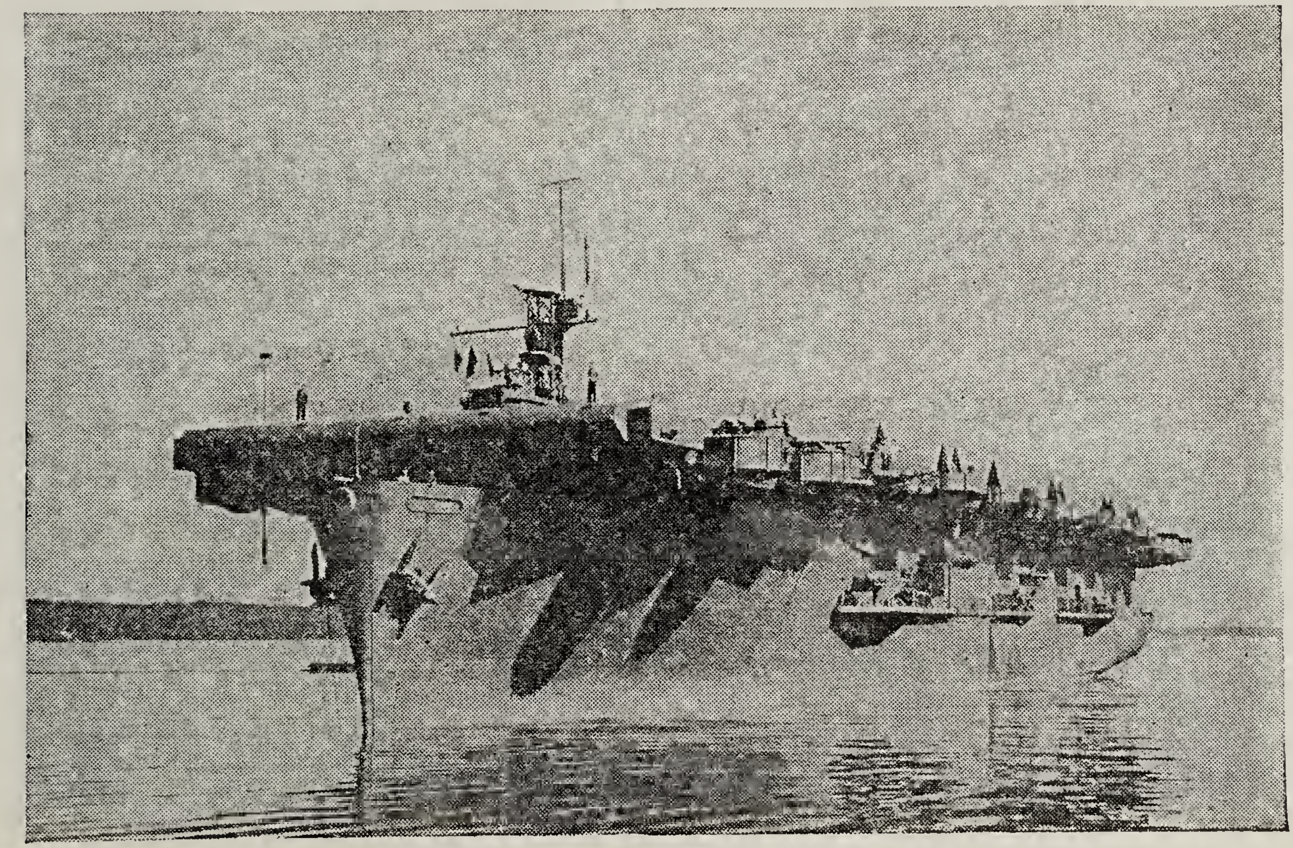


FIGURE 19-4.—A "baby flat top."

Damage from torpedoes is controlled by both heavy armor and compartmentation. The basic purpose of a battleship's armor and defensive armament is to keep its main battery guns in action.

During large scale actions, battleships seldom fight alone, but are usually screened by cruisers and destroyers. When used to aid in escorting convoys, the mere presence of a battleship may serve to keep lesser enemy surface ships at a safe distance. Whether actually in action or merely threatening it, a battleship represents great power.

Aircraft Carriers (CV, CVL, CVE).—The basic difference between aircraft carriers and the other large fighting ships of the fleet is that their armament consists of planes instead of guns. Carriers are simply floating airfields. They not only provide takeoff and landing space for their planes, but also carry fuel, ammunition, equipment, spare parts and repair facilities. Carriers provide complete living facilities for aircraft crews. To perform their function, large combat carriers (CV) must have high speed and great seaworthiness. The high speed is important in operations with task forces, in affording some protection against air or submarine attack, and in assisting planes to get into the air and land on the flight deck. Seaworthiness and steadiness are important factors in take-offs and landings during rough weather. Opposed to this advantage is the fact that the larger the ship and the flight deck, the better is the

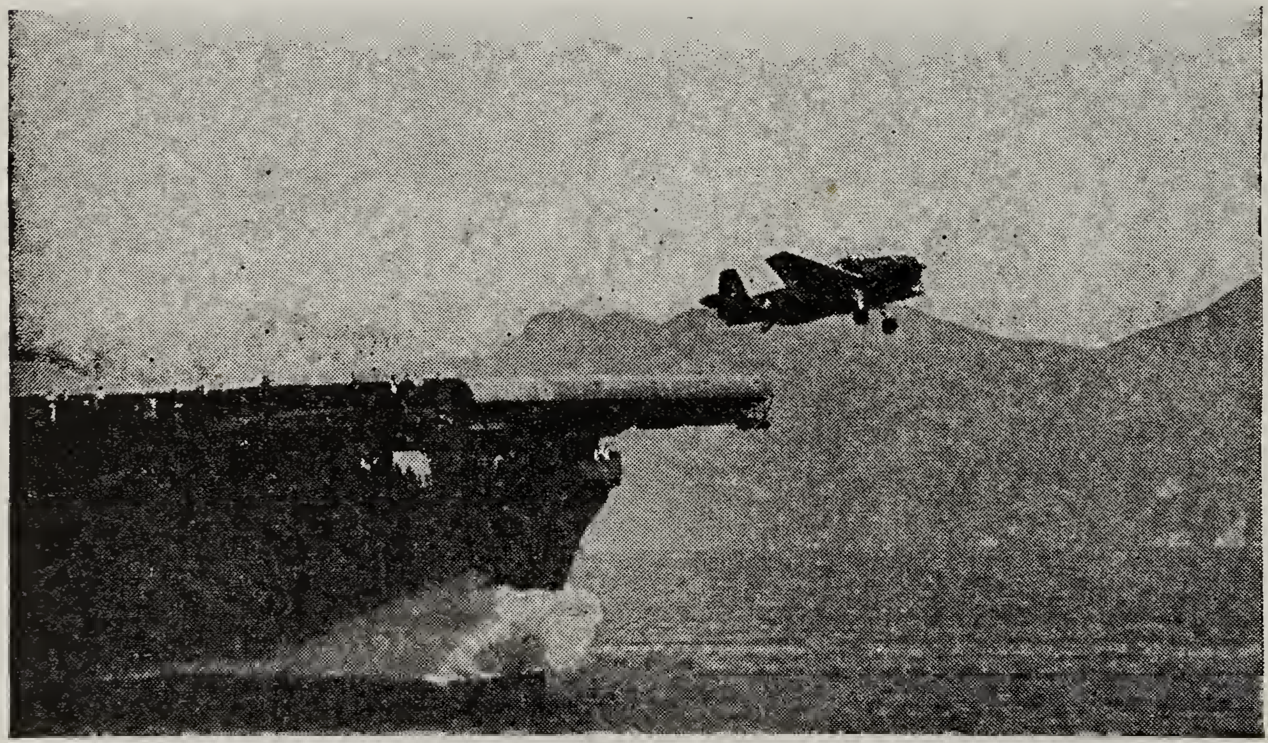


FIGURE 19-5.—An Avenger taking off from an aircraft carrier.

target presented for enemy bombs and torpedoes and the greater is the difficulty of defense.

The vulnerability of carriers is offset by three principal means of protection. First, our large carriers mount a great number of anti-aircraft guns, including 5-inch dual purpose, 40 mm., and 20 mm. Second, carriers supply their own defensive fighter plane cover to intercept attacking enemy aircraft. Third, cruisers and destroyers are employed to screen and protect carriers from enemy surface and submarine attack. When these three defensive elements are combined with the great offensive hitting power of torpedo and dive bombers, it is hard for the enemy to get in close enough to strike. Air power is a decisive factor in naval operations. To counter their vulnerability, it has been said that the best protection for carriers is to have more of them.

Our carriers fall into three main categories. The CV's are large combat carriers, specifically designed for operations with task forces.

CVL's are converted cruiser types, built to meet the pressing need for carriers at the start of the war. CVE's are smaller and slower, designed to escort convoys and supplement the task force airpower provided by CV's.

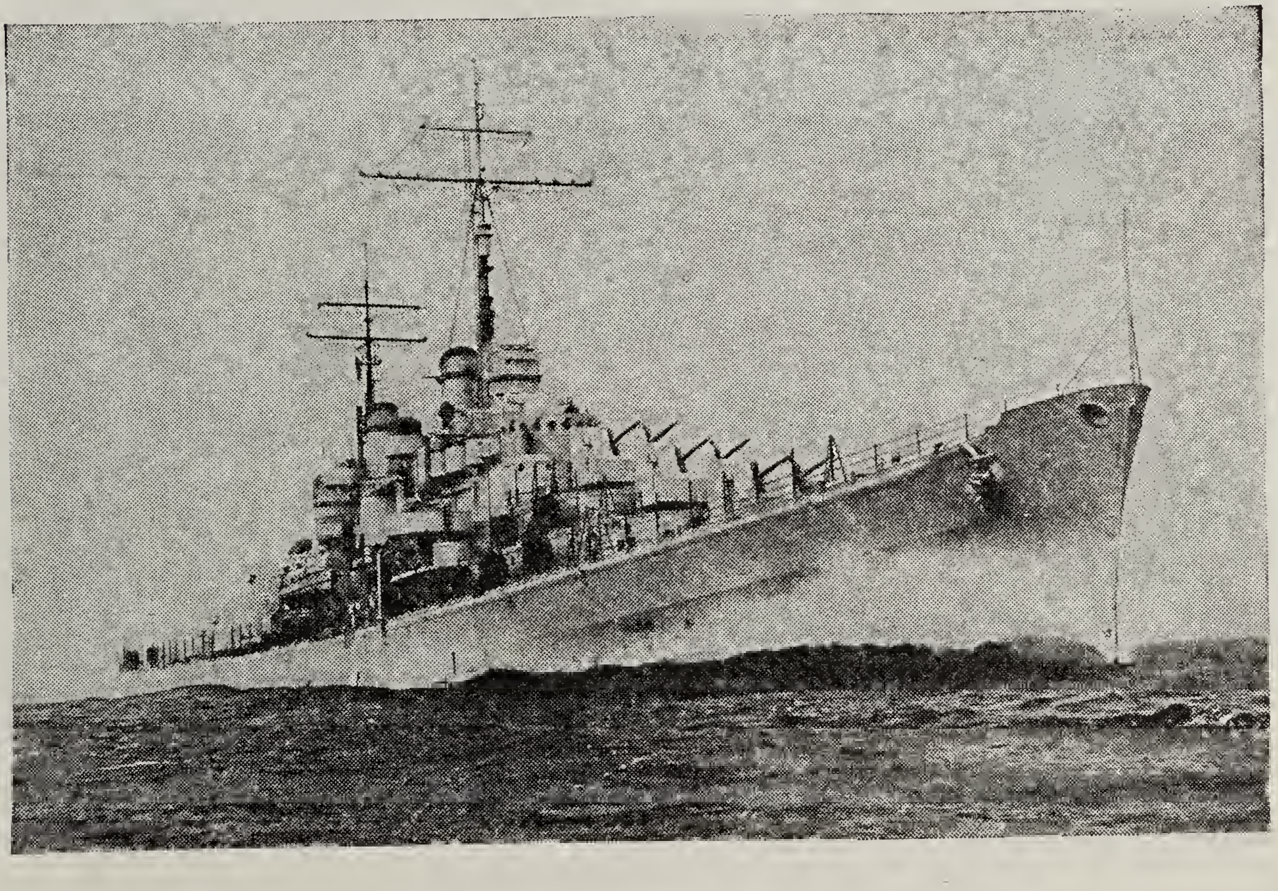


FIGURE 19-6.—A modern light cruiser.

Cruisers (CA) (CL).—Cruisers are the general utility ships of the Navy. They can operate alone, in groups, or with the battle fleet. They are fast ships, of long range, with relatively heavy armament but light armor. They are designed to cope with all ships except battleships and larger cruisers. When used with the battle fleet, they act as scouts, they screen or lead destroyer attacks, guard aircraft carriers and support amphibious operations. Cruisers have performed exceptionally well in sudden bombardment raids on enemy shore installations.

Cruisers range in displacement from 5,000 to 15,000 tons. Those carrying guns of 6 inches or under in size are classed as light cruisers (CL). Those carrying guns over 6 inches are classed as heavy cruisers (CA). To augment their usefulness as scouts for the fleet, cruisers carry their own aircraft up to 8 in number. These are seaplanes, launched by catapult, and recovered by cranes. The typical boxlike stern of a cruiser results from the incorporation of hangar space aft to stow the planes.

Destroyers (DD).—Destroyers are multi-purpose ships which have been built in great numbers and which are useful in almost any kind of naval operation. Their primary features are armament and speed. Armor protection and cruising range have been sacrificed. For their size, destroyers carry a big punch. In addition to multiple

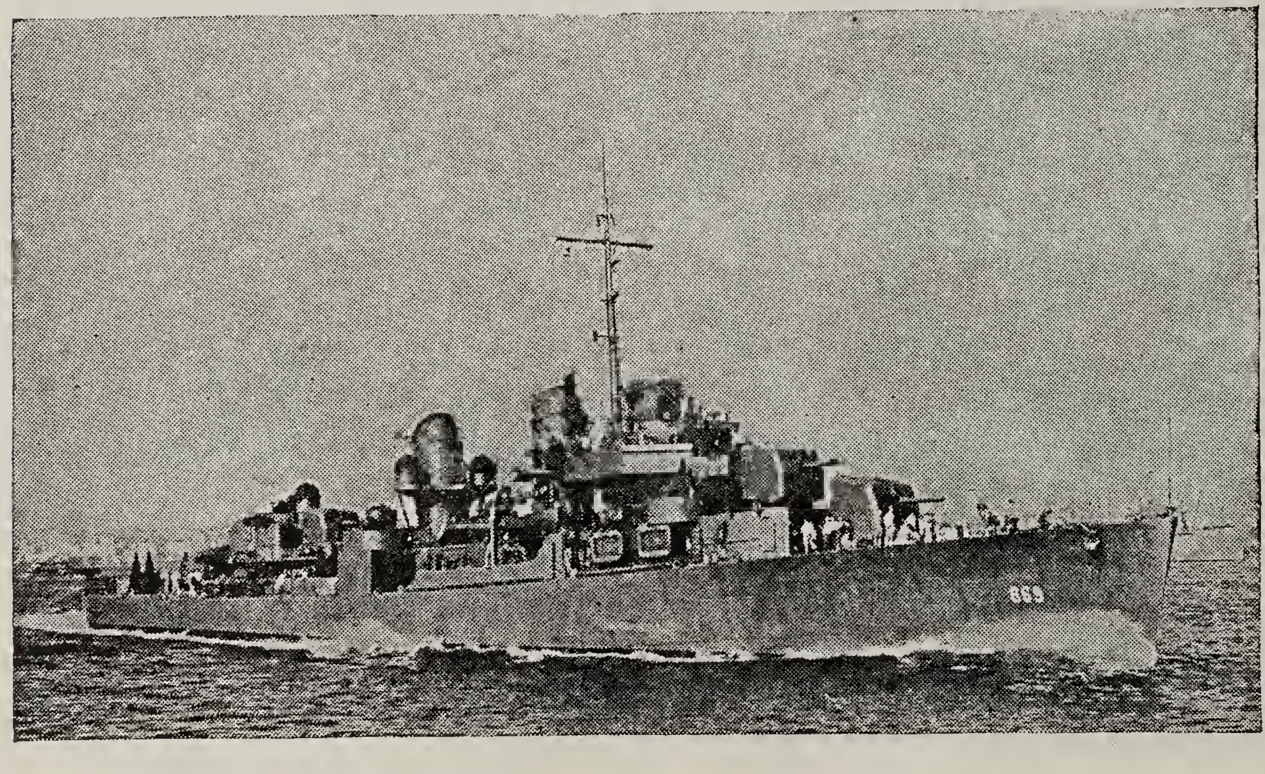


FIGURE 19-7.—A modern destroyer.

torpedo-tube mounts, they carry from five to eight 5-inch dual purpose guns, together with depth charges for anti-submarine action.

Destroyers act as screens against attacks by larger ships and by aircraft; their torpedoes are used to make hit-run attacks against heavier enemy ships; they lay down smoke screens for other ships; they act as short range scouts; they escort convoys; and they support landing operations.

Modern destroyers carry the most up-to-date and complete equipment for detection of enemy units and for fire control. Due to their great speed and maneuverability, they present a difficult target for enemy aircraft. While small compared to a battleship's main battery, their 5″ guns are extremely accurate and are capable of inflicting great damage.

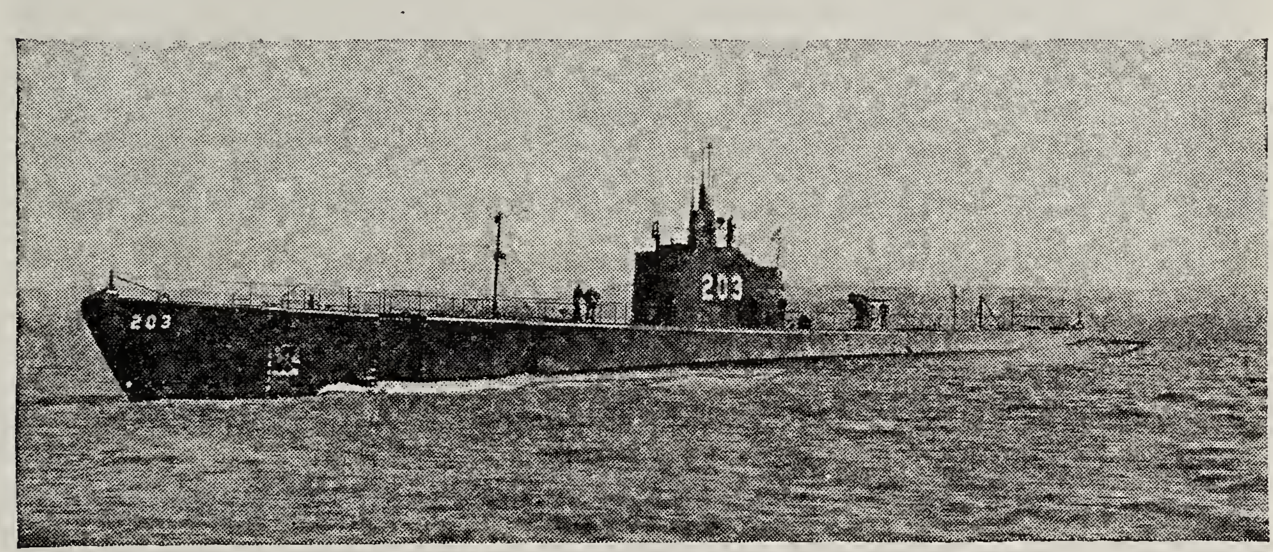


FIGURE 19-8.—A United States submarine.

Submarines (SS).—Submarines have an importance in naval warfare out of proportion to their size. It is not uncommon for a single submarine to sink 20 times its own weight in enemy shipping. The sinking of hundreds of Japanese ships by our submarines has been an important factor in the Pacific War. In the war with Germany, destruction of our shipping by U-boats caused a great crisis in our war effort. A submarine's torpedoes can sink anything that floats, from a battleship down. Her deck guns are used against small craft or defenseless merchant ships.

Submarines operate either on or under the surface. It is customary for submarines in enemy waters to travel on the surface at night and to submerge to avoid detection during daylight. Large submarines have extremely great cruising range and can keep the sea

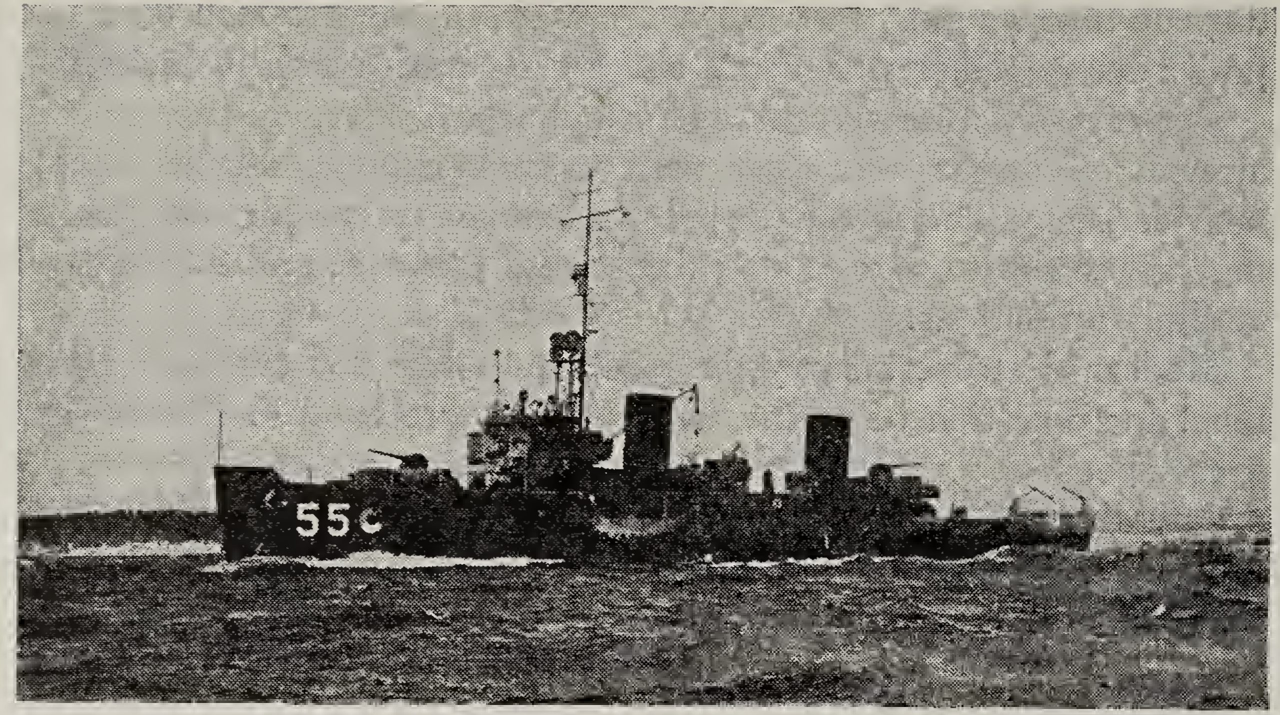


Figure 19-9.—An armed minesweeper.

for long periods. In addition to their effectiveness in sinking enemy ships, submarines are valuable as scouts and for putting reconnaissance parties ashore in enemy territory.

Minecraft.—Minecraft include minelayers and minesweepers. There are many different types and designs, from high speed minesweepers which travel with, or precede, a fleet or task force, to small harbor vessels. The largest of our minelayers are formidable ships, capable of laying hundreds of mines in enemy waters in a short time. Submarines are sometimes fitted out to lay mines.

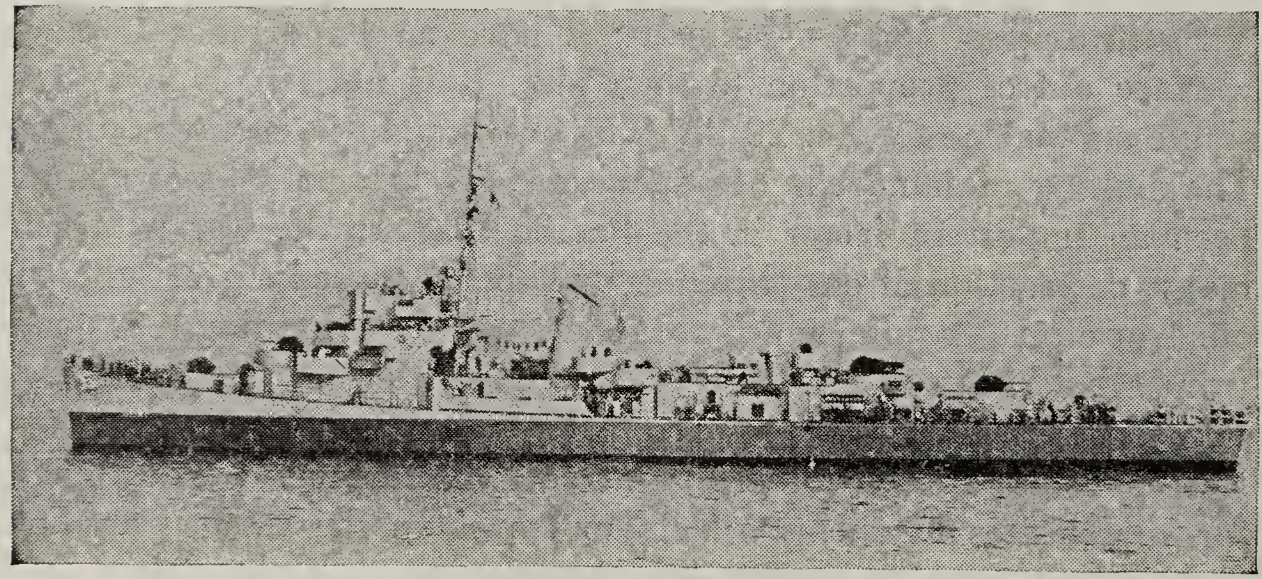


Figure 19-10.—A destroyer escort (DE).

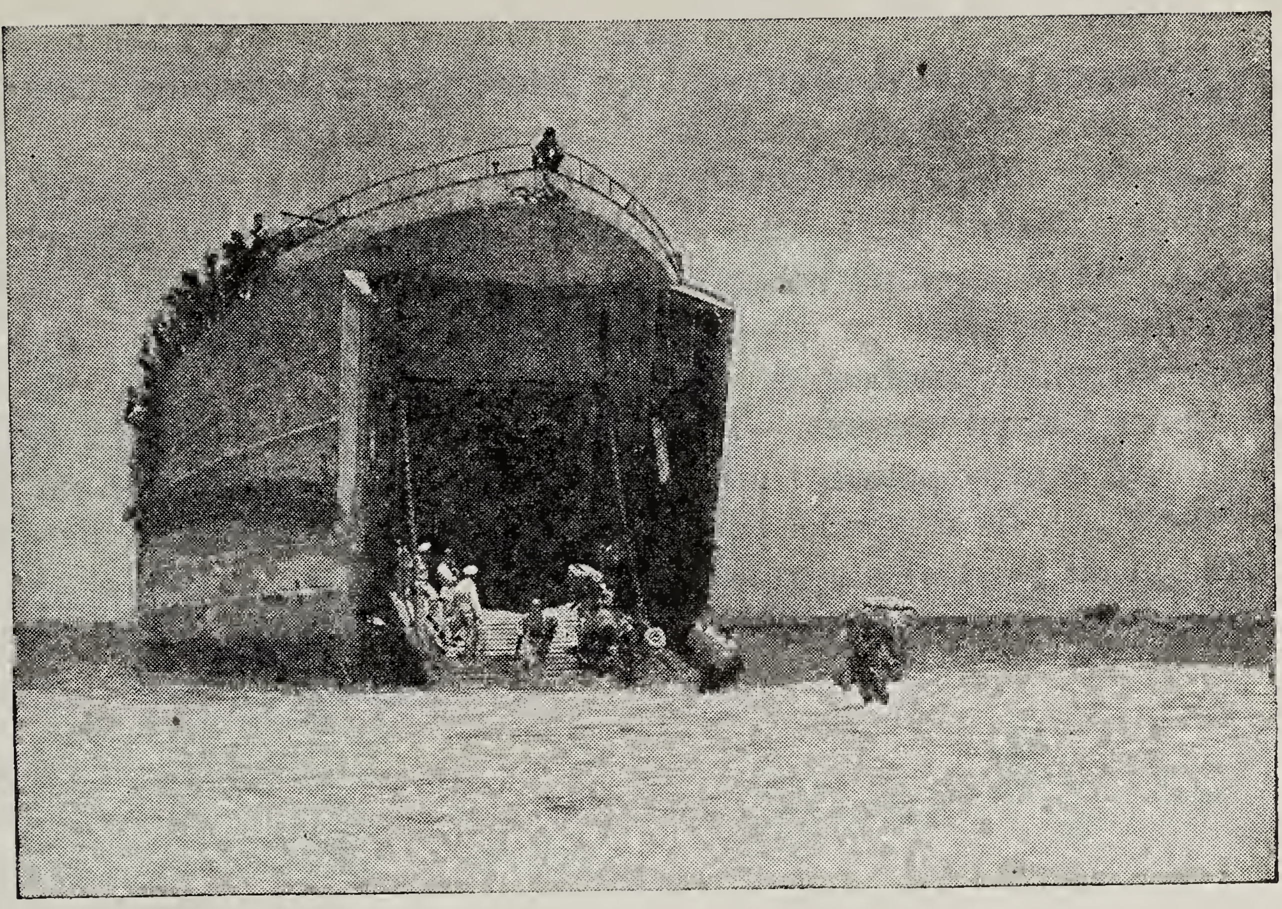


Figure 19-11.—A landing ship tank (LST).

Destroyer Escorts (DE).—This relatively new class of ship was designed to combat the German submarine menace. Smaller

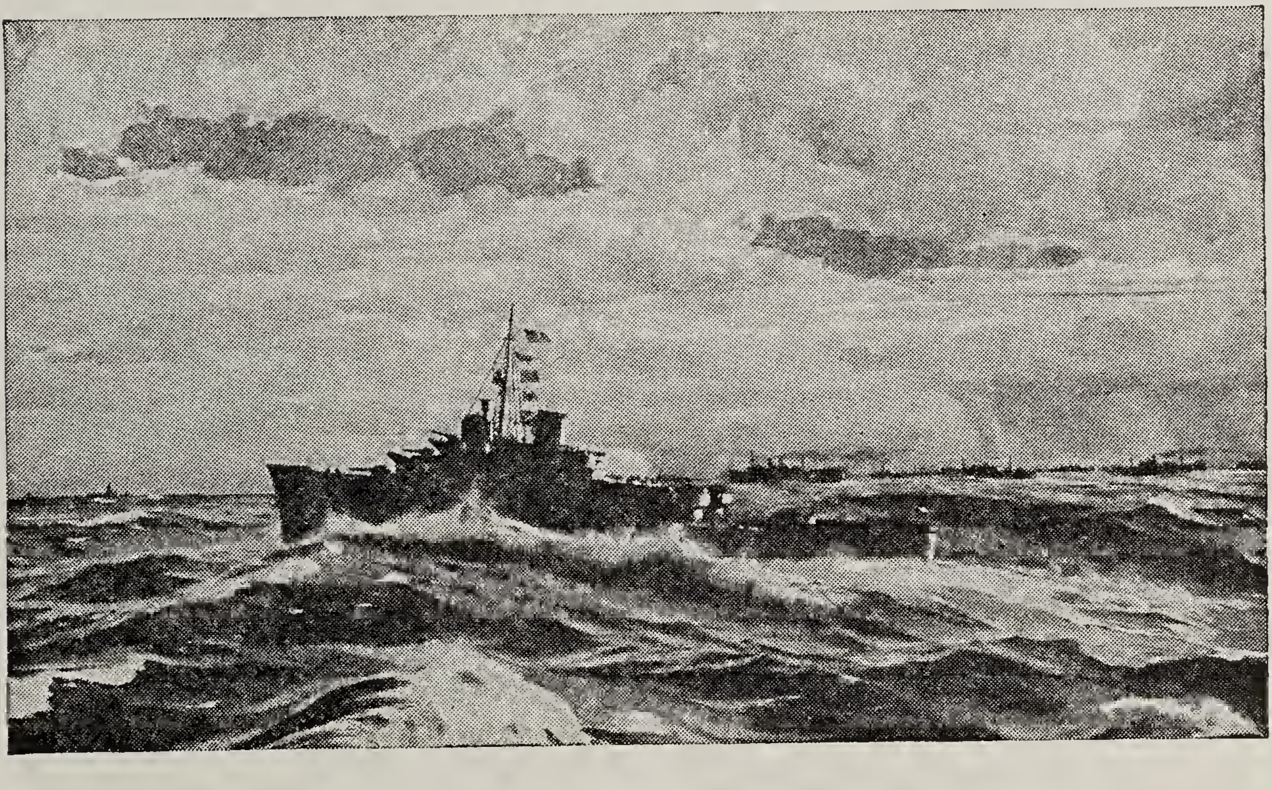


Figure 19-12.—A Coast Guard cutter patrolling a convoy.

than destroyers and carrying lighter armament, they carry the most complete and effective equipment for detecting and destroying enemy submarines. Their principal use is to escort shipping.

Landing ships and landing craft.—Craft for carrying on amphibious warfare have been developed in a great many different types. The photograph on page 183 shows one type of landing ship in action. The chart on page 173 indicates the great variety of landing craft which has been developed.

Coast Guard cutters.—The Coast Guard cutter has carried out extensive convoy patrol. During wartime the Coast Guard is a part of the Navy. Its personnel have engaged extensively in Naval operations in all parts of the world.

CHAPTER 20

Aircraft of the Navy

Naval aircraft are of great and ever increasing importance in the present war. From a relatively small beginning only a few years ago, our Naval air arm has undergone many changes, and new strategy and tactics are constantly being developed. The changes in the design, equipment and use of Naval aircraft are continuous. While there is an endless variety of types and models, only the principal ones will be discussed in general terms in this manual.

The term *Naval aircraft* includes both heavier-than-air and lighter-than-air craft. Since the use of lighter-than-air craft is somewhat limited, the term *Naval aircraft* will be used to indicate heavier-than-air craft unless otherwise specified.

The activities of Naval air power include reconnaissance of enemy surface forces and shore establishments by direct observation and aerial photography; patrols to locate and intercept enemy air forces; strategic bombing of enemy shore establishments; bombing and torpedoing of enemy war and merchant ships; tactical bombing and strafing of enemy forces during amphibious operations; spotting and observation of gunfire during bombardment; destruction in direct combat of enemy forces in the air; transportation of men and vital equipment; and anti-submarine warfare and convoy protection.

Naval aircraft include carrier based, land based, seaplane and amphibious types. Carrier and land based planes operate from flight decks, flight strips or developed airfields. Seaplanes operate only from water and by the use of catapults. Amphibious planes are designed to operate either from water or landing fields.

Due to the relatively small size of flight decks on even the largest aircraft carriers, ship-based planes are necessarily limited in size and are of special design. A rough idea of the difference between land based and ship based aircraft can be gained from the fact that the flight deck on our largest carriers at the present time is less than 1,000 feet, while a moderate runway length for heavy land based planes is 5,000 feet.

Seaplanes are carried aboard battleships and cruisers and are used for scouting, observation and spotting gunfire. They are launched by catapult and after landing on the water are hoisted aboard by cranes. A large cruiser may carry as many as 8 such planes.

In the Pacific theater the use of Naval aircraft is closely coordinated with that of land based Army air forces.

NOMENCLATURE OF AIRCRAFT

While there is a wide variety in the design of individual types of heavier-than-air craft, there are many parts which are common to all types. The main body of a plane is the *fuselage,* to which the *wings* and the *tail assembly* are attached. The wings extend from the sides of the fuselage and support the plane in flight. They are equipped with *ailerons* to stabilize the plane laterally and *landing flaps* to reduce airspeed for landing. Almost all planes are of *monoplane* or single wing design. The overall distance from wing tip to wing tip is the *span.* The tail assembly functions to control the plane in flight and includes the *stabilizers* or *fins*, *elevators* and *rudder.* Motive power is furnished by engines and transmitted to *propellers.*

In single-engine planes, the engine and propeller are mounted in the forward end of the fuselage; in multi-engine planes, either 2 or 4 engines are mounted in *nacelles* attached to the wings. Propellers move the plane forward by their action on the air. Modern propellers are of the variable-pitch type, which means that each blade may be rotated to secure the proper "bite" on the air. Most propellers have 3 blades.

Land based planes take off and land by the use of wheeled *landing gear,* usually retractable. Seaplanes and amphibians may use the fuselage as a *hull* to provide flotation, or they may be equipped with *pontoons* and floats. Amphibians and seaplanes are equipped with *retractable wheels* for operation from land, or handling on ramps.

TYPES OF AIRCRAFT

Due to rapid changes in design and tactical use of Naval aircraft, types often overlap each other, and frequently one type of aircraft is employed for more than one function. The characteristics of the principal types are given below.

Fighters.—Fighters are primarily designed to engage in combat with enemy aircraft and to destroy them in the air or on the ground by gunfire. Navy fighters operate either from carriers or from land.

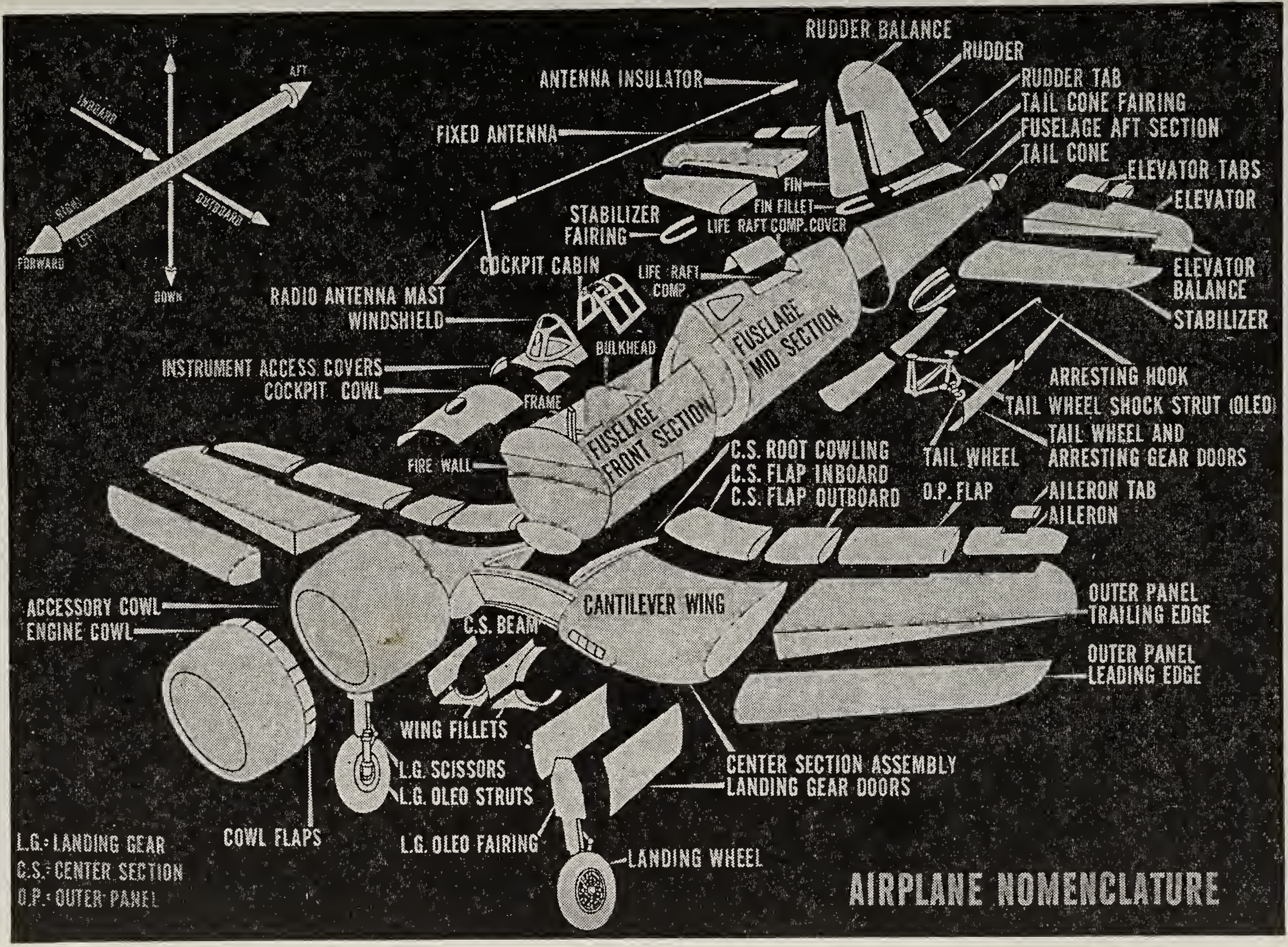

UP
AFT
INBOARD
OUTBOARD
RIGHT
LEFT
FORWARD
DOWN
RUDDER BALANCE
RUDDER
ANTENNA INSULATOR
RUDDER TAB
TAIL CONE FAIRING
FIXED ANTENNA
FUSELAGE AFT SECTION
TAIL CONE
ELEVATOR TABS
FIN
FIN FILLET
ELEVATOR
STABILIZER FAIRING
LIFE RAFT COMP. COVER
COCKPIT CABIN
LIFE RAFT COMP.
ELEVATOR BALANCE
RADIO ANTENNA MAST
WINDSHIELD
STABILIZER
FUSELAGE MID SECTION
BULKHEAD
INSTRUMENT ACCESS COVERS
COCKPIT COWL
ARRESTING HOOK
FRAME
TAIL WHEEL SHOCK STRUT (OLEO)
FUSELAGE FRONT SECTION
TAIL WHEEL AND ARRESTING GEAR DOORS
C.S. ROOT COWLING
C.S. FLAP INBOARD
TAIL WHEEL
FIRE WALL
C.S. FLAP OUTBOARD
O.P. FLAP
AILERON TAB
AILERON
OUTER PANEL TRAILING EDGE
CANTILEVER WING
ACCESSORY COWL
ENGINE COWL
C.S. BEAM
OUTER PANEL LEADING EDGE
WING FILLETS
CENTER SECTION ASSEMBLY
L.G. SCISSORS
LANDING GEAR DOORS
L.G. OLEO STRUTS
L.G.: LANDING GEAR
COWL FLAPS
L.G. OLEO FAIRING
C.S.: CENTER SECTION
LANDING WHEEL
O.P.: OUTER PANEL
AIRPLANE NOMENCLATURE

FIGURE 20-1

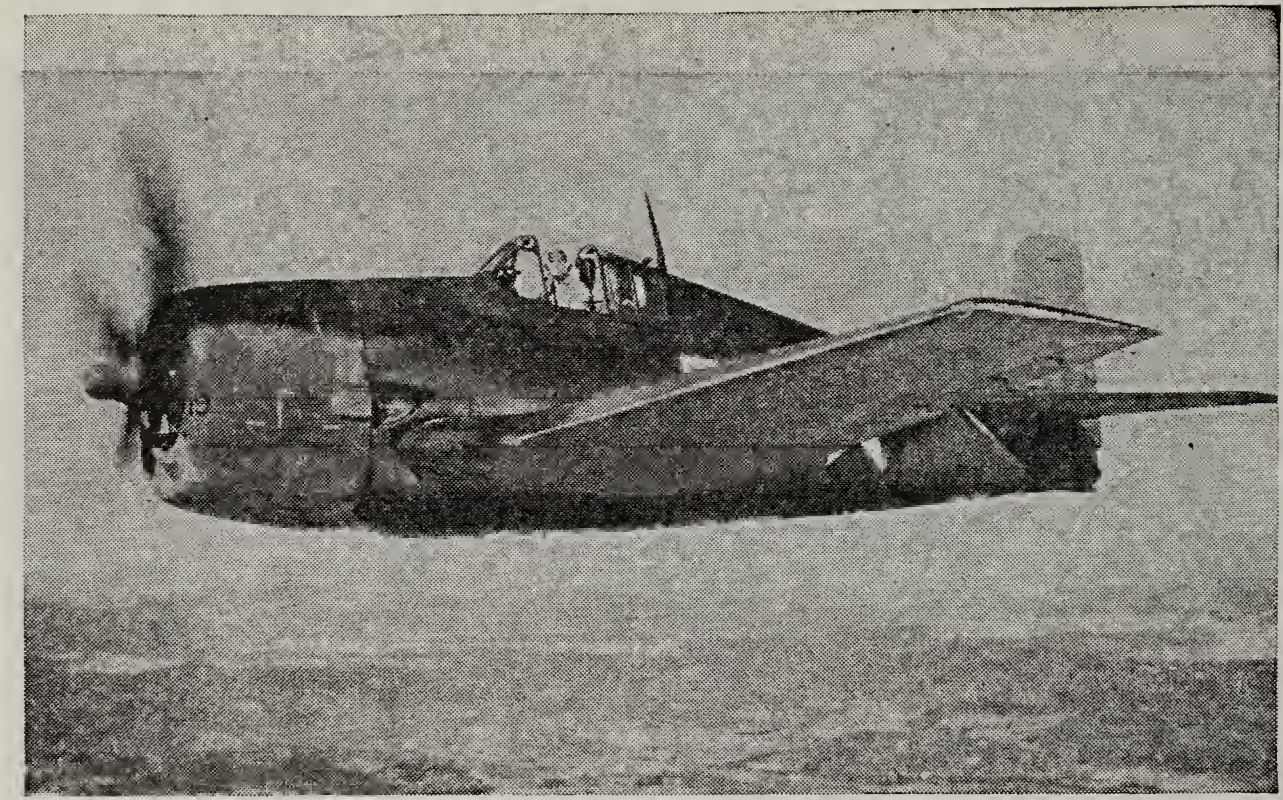


FIGURE 20-2.—The Hellcat.

They are normally single-engine monoplanes. They are designed for high speed, rapid climb, maneuverability and heavy fire power. Their guns are usually .50 caliber, mounted in the wings and fixed to fire forward, so that fire is directed by maneuvering the plane. Navy fighters are relatively short range aircraft, and while they are sometimes used for reconnaissance, short range patrol, and as protective cover for bombers, their radius of action is limited in comparison with other types.

The principal types of fighter in use at the present time are the "Wildcat," "Corsair," and the "Hellcat."

Scout Bombers.—Scout bombers are designed for reconnaissance and patrol work in advance of the Fleet to gain information concerning the enemy and to provide security against surprise attack. They are also used to attack enemy ships and shore installations by dive bombing. Their mission may include pure scouting, search and attack, or planned attack on designated objectives. Scout bombers generally carry a crew of two men. The pilot flies the ship, controls the forward guns, and releases the bombs. The gunner operates the rear flexibly-mounted machine gun and assists with radio, other communications and navigation. He may also operate photographic

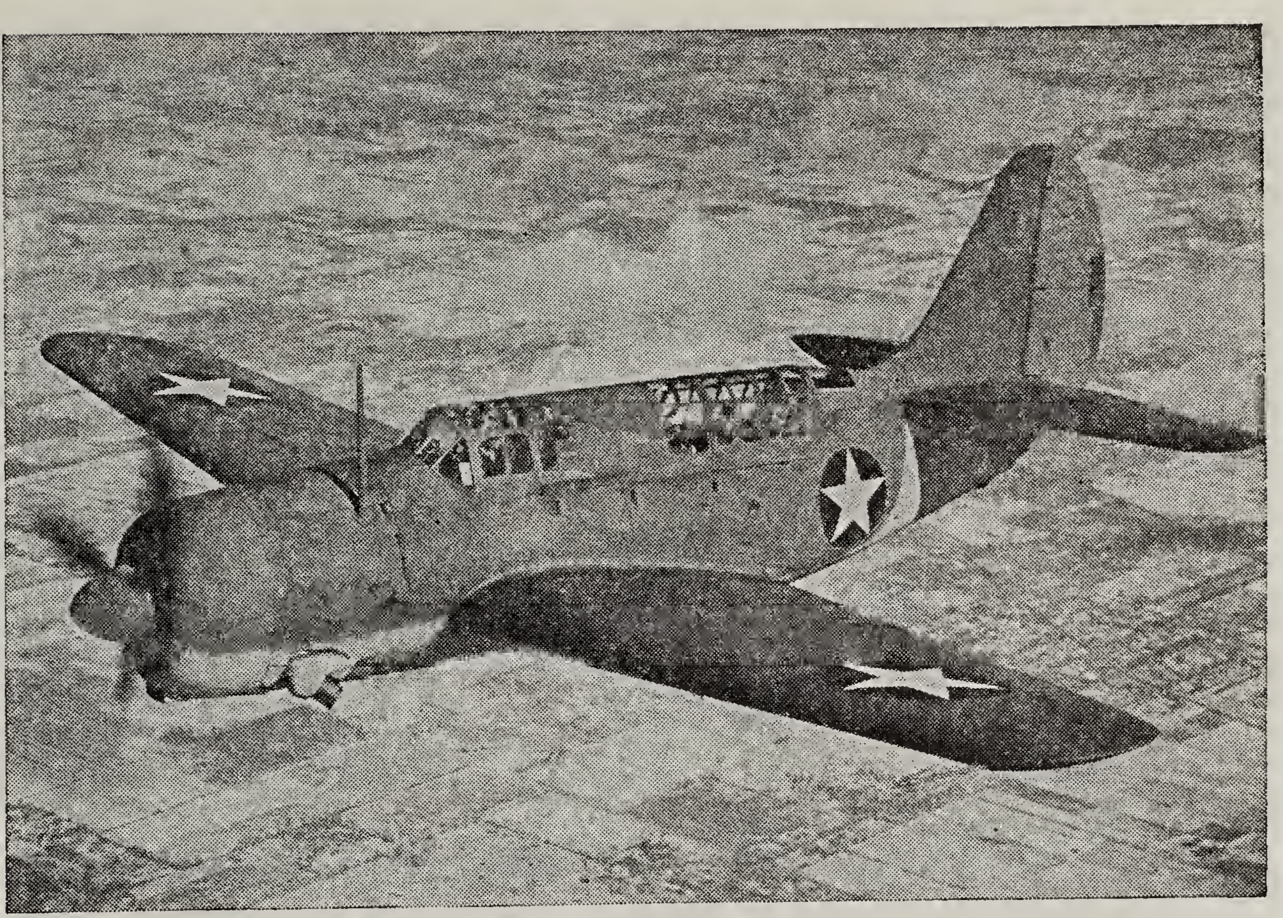


FIGURE 20-3.—The Helldiver.

equipment. Bombs are generally released while the plane is in a dive, but may also be released in normal flight. Scout bombers operate from carriers, from land, or both.

In its design and the variety of its missions, the scout bomber may be considered the most flexible type of ship based aircraft. Current models include the "Dauntless" and the "Helldiver."

Torpedo Bombers.—The torpedo bomber is specifically designed to sink enemy war and merchant ships. It may be based on carriers, land, or both. It carries a single aerial torpedo, which is capable of sinking or inflicting heavy damage on any type of ship. This bomber is manned by 2 or 3 men. The pilot flies the plane and releases the torpedo; 1 or 2 gunners operate the rear turret and ventral machine guns. Torpedo bombing attacks must be made from very low altitudes in order to aim the torpedo properly and prevent it from breaking upon striking the water. It is extremely difficult for a ship to repel successfully a determined attack by a number of torpedo bombers. The destructive effect of a well aimed torpedo is generally much greater than that of an equal weight of aerial bombs,

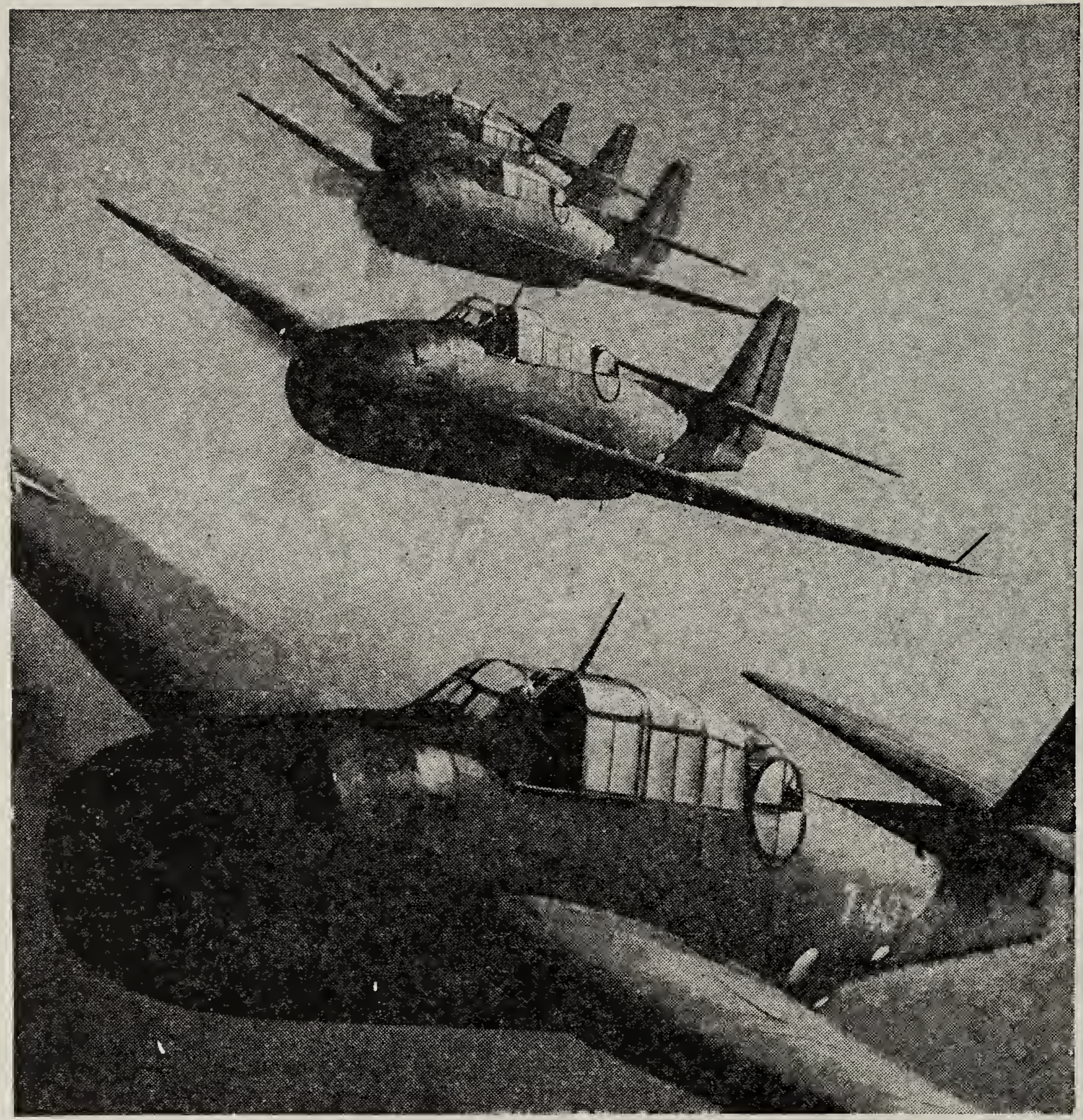


FIGURE 20-4.—The Avenger.

due to the effect of underwater explosion. Torpedo bombers may also be loaded with up to 2,000 pounds of aerial bombs for attack against enemy ships or shore installations.

The best known Navy torpedo bomber is the "Avenger."

Reconnaissance Planes.—Reconnaissance or scout observation planes have been called the "eyes of the fleet." Their principal function is to detect enemy surface units and to spot ship's gunfire. They are carried aboard battleships and cruisers, launched by catapult, and recovered from the water by cranes. While most scout observation planes are seaplanes, some models have wheels instead of floats for operation from carriers or land. They carry a crew of 2 men. The

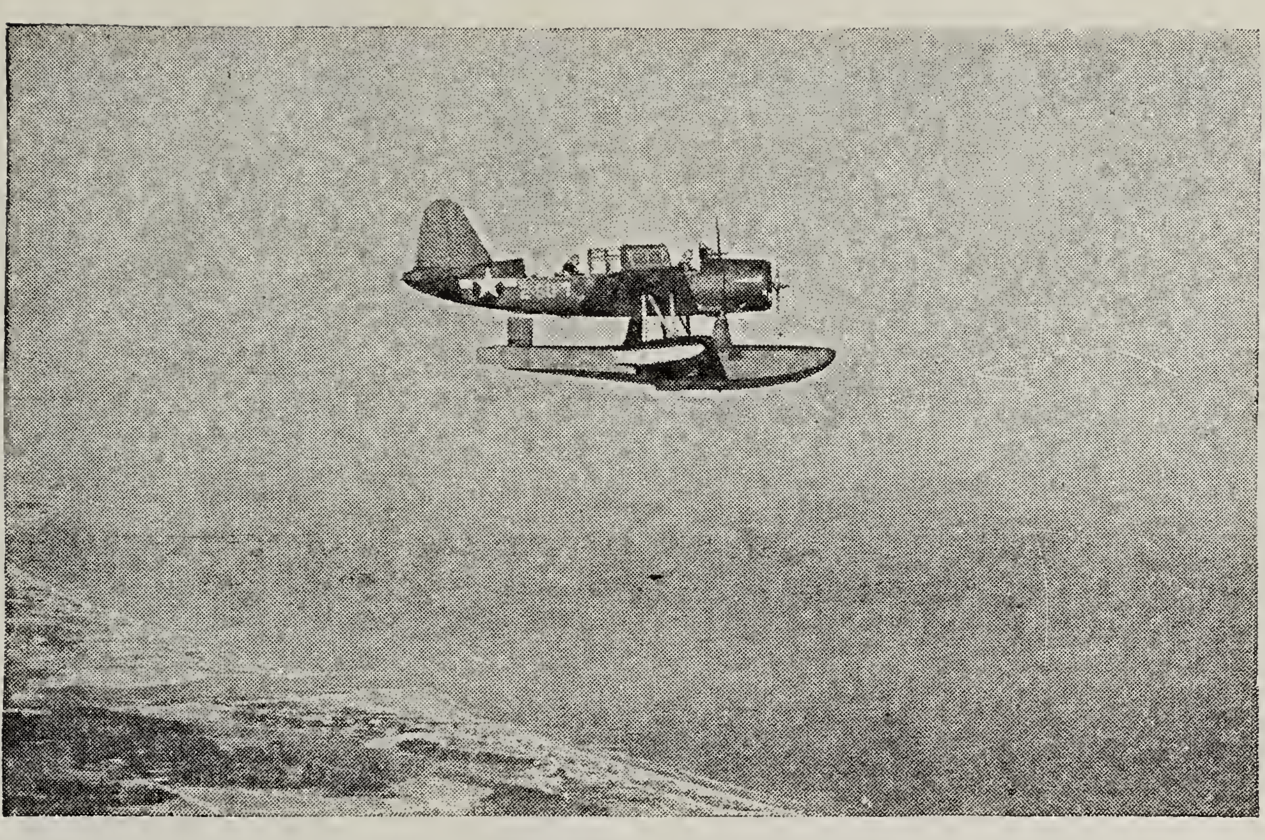


Figure 20-5.—The Kingfisher.

pilot flies the plane and does most of the navigating. The observer spots gunfire, and handles communications, photography and navigational aids. Since scout observation planes carry only light armament, they are not designed to engage in combat.

A recent type of scout observation plane is the "Kingfisher."

Seaplane Patrol Bombers.—Seaplane patrol bombers operate

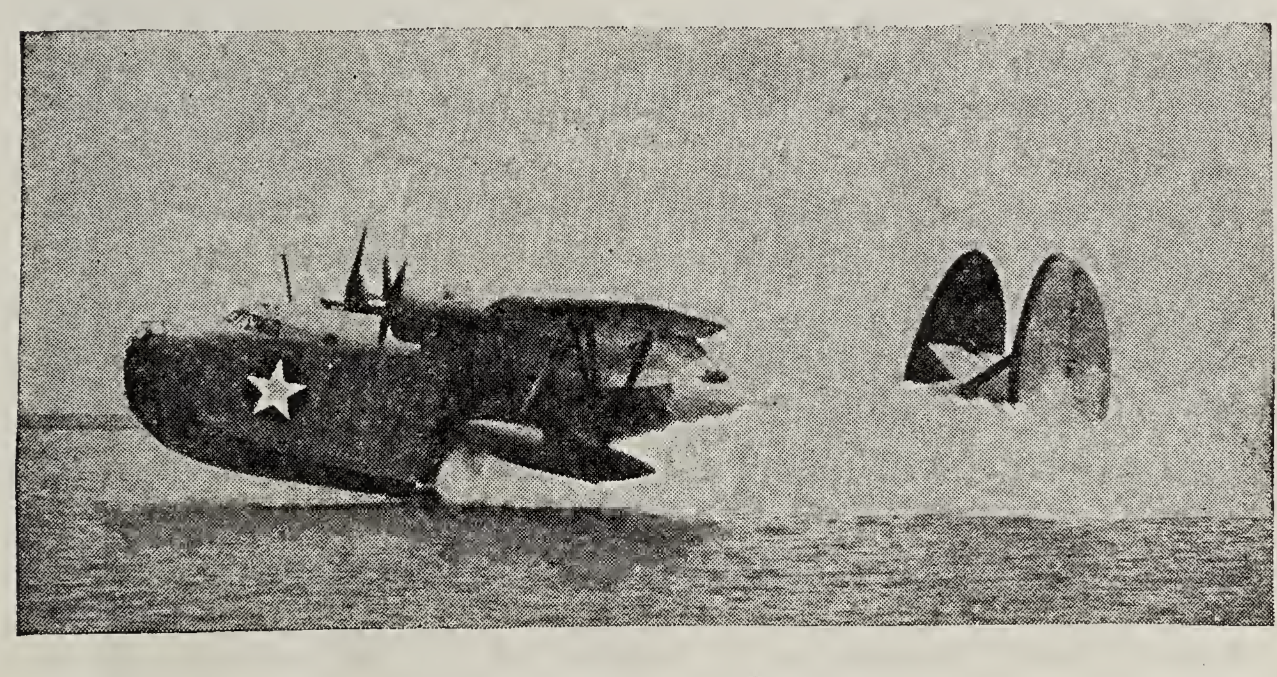


Figure 20-6.—The Mariner.

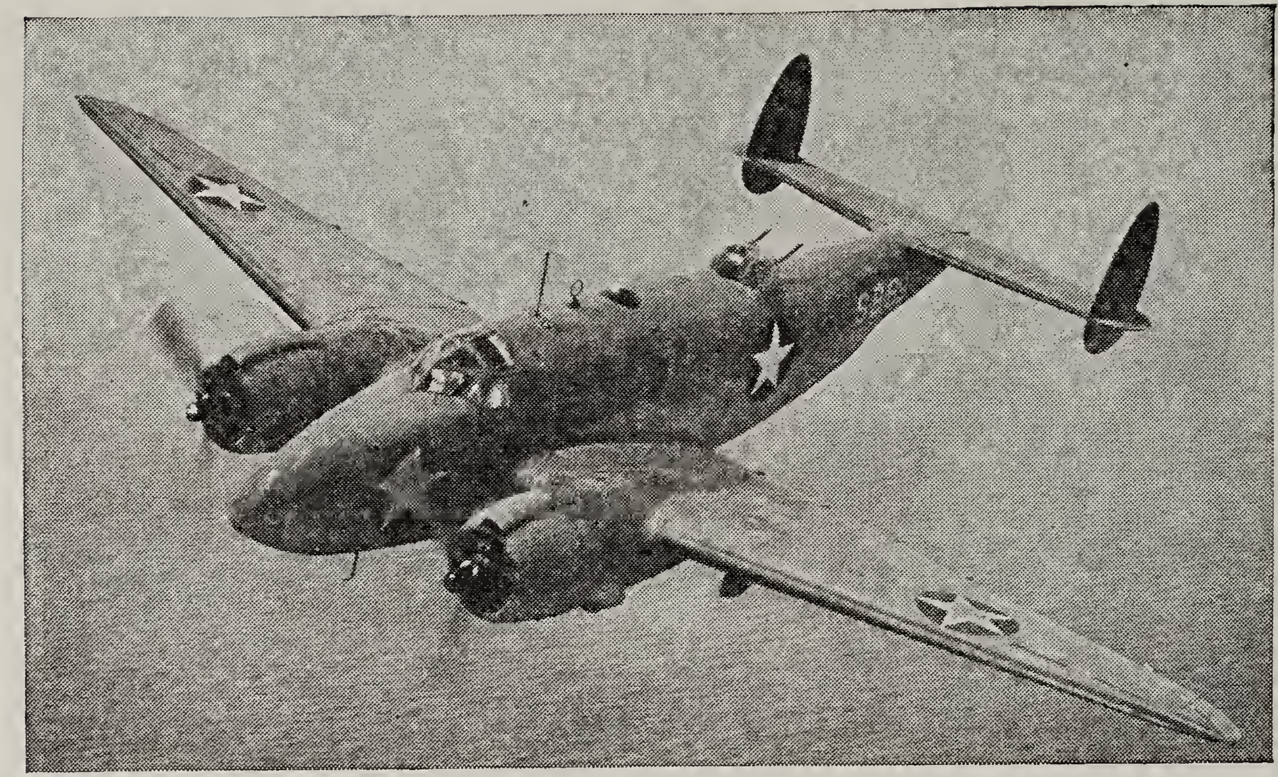


FIGURE 20-7.—The Ventura.

at long range over water. They are designed and equipped to stay in the air for many hours and can be refueled and reprovisioned at relatively undeveloped advanced bases. These large heavy flying boats have 2 or 4 engines. They may carry both bombs and depth charges, and later models have considerable defensive fire power. They can land and take off successfully even in moderately rough sea. Their activities and duties include reconnaissance over wide areas, search and attack, anti-submarine patrol, convoy protection and bombing of specific objectives. Due to their relatively low speed, limited altitude and lack of maneuverability, patrol bombers are primarily used for reconnaissance and convoy missions, and have to some extent been replaced by land based bombers for heavy bomb attack. Many are fitted out as photographic planes or for other special missions. The number and composition of the crew will vary with the model and mission.

One of the best known models is the "Catalina," which made history during the early part of the war by its great variety of exploits, including emergency use as dive and torpedo bomber in the Pacific theater. Later models of patrol bombers include the "Mariner" and the "Coronado."

Land-Based Bombers.—In addition to bombers specifically developed for Naval use, the Navy also employs many land based bombers of the same types used by the Army. Land based bombers have some advantage over flying boats in speed, ceiling, maneuverability and defensive armament. This is due primarily to the large size of the flying boat hull and the difficulty of mounting defensive armament on its underside.

A well known type is the "Liberator," which has been equipped specially for overwater patrol and has been used widely and successfully in anti-submarine warfare. Another land plane widely used by the Navy is the "Ventura," a medium bomber of high speed and great flexibility.

Non-Combat Aircraft.—The Navy uses many types of aircraft designed for other than combat duties. These include transport, utility and training planes. Many seaplane patrol bombers, particularly older models, have been converted for transportation of cargo and personnel. Land based bombers of older design and new types of cargo planes are also used as transports. Utility aircraft are used for a variety of tasks, including carrying of mail, supplies and personnel between bases and to ships; towing of anti-aircraft gunnery targets; photography; as ambulances; and for other general and emergency duties. Planes designed specifically for training are classified as primary, basic and advanced, corresponding to the stages of training. Operational training is given in combat types.

Lighter-Than-Air Craft.—The Navy uses nonrigid airships,

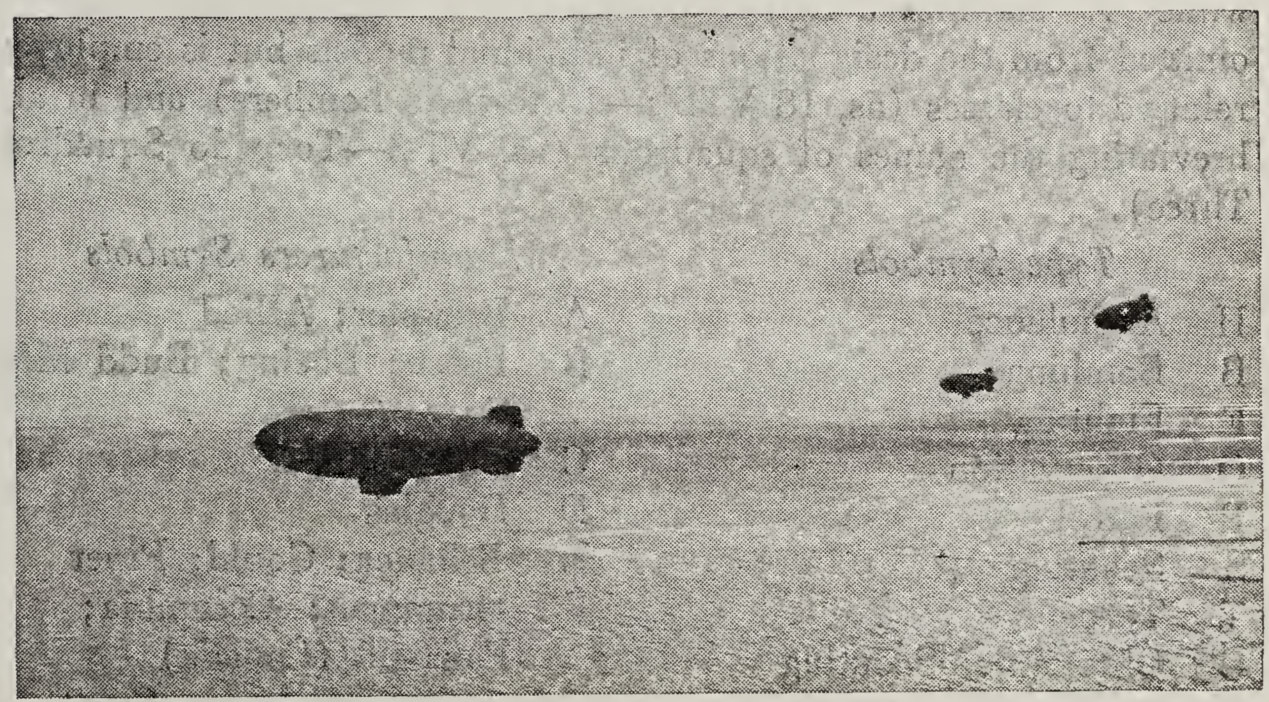


FIGURE 20-8.—Navy blimps.

commonly called blimps, for coastal and offshore patrol, principally in connection with anti-submarine warfare. Blimps carry bombs, depth charges and machine guns. For anti-submarine warfare, they have certain advantages over heavier-than-air craft. These include a range of speed from zero to over 60 knots, maneuverability in 3 dimensions, ability to keep the air for long periods and to withstand adverse weather conditions, and effectiveness in operations under conditions of low visibility.

Another type of lighter-than-air craft is the barrage balloon, which carries no crew, and is moored by cable from auxiliary and merchant ships as a protection against enemy aircraft, principally dive bombers.

AIRCRAFT DESIGNATIONS

Navy aircraft are designated by one or two letters indicating the class of aircraft; a number indicating the model (in the case of first models the number is omitted); a letter indicating the manufacturer; and a number to designate the modifications of the model. A change of model is a major change in design; a modification is a minor change in a model. As an example, the first model of a patrol bombing plane to be produced by Consolidated Aircraft would be the PBY-1. The modifications to this aircraft would be the PBY-2, PBY-3, etc. The second patrol bombing plane built by this company would be the PB2Y-1 and successive modifications to this plane would be the PB2Y-2, PB2Y-3, etc. The letter "V" signifies a heavier-than-air craft, while "Z" signifies a lighter-than-air craft. The type letter "V" is omitted from the designations of individual models but is employed relative to classes (as, 18 VTB's—18 torpedo bombers) and in abbreviating the names of squadrons (as, VT-3—Torpedo Squadron Three).

Type Symbols

H	Ambulance
B	Bombing
F	Fighting
O	Observation
P	Patrol
S	Scouting
T	Torpedo
OS	Observation-Scouting
N	Training
R	Transport (Multi-engine)

Manufacturers Symbols

A	Brewster; Allied
B	Beech; Boeing; Budd Mfg. Co.
C	Curtiss
D	Douglas
E	Bellanca; Gould; Piper
F	Grumman; Columbia; Fairfield (Canada)
G	AGA; Goodyear; Great Lakes

Type Symbols

G	Transport (Single-engine)
J	Utility
BT	Bombing Torpedo
PB	Patrol-Bombing
SB	Scouting-Bombing
JR	Utility-Transport
L	Glider
ZN	Airship (Nonrigid)
SO	Scouting-Observation
SN	Scout-Training
TB	Torpedo-Bombing

Manufacturers Symbols

H	Howard; Hall Aluminum Co.
J	North American
K	Fairchild (U.S.) ; Nash-Kelvinator
L	Bell; Langley
M	Glenn L. Martin; General Motors
N	Naval Aircraft Factory
O	Lockheed
P	Spartan
Q	Bristol
R	Ryan; Aeronca
S	Sikorsky; Stearman (Boeing) ; Schweizer
T	El Lequndo Plant (Douglas) ; Taylorcraft; Northrop; Timm
U	Chance Vought (United)
V	Vultee; Vickers; Vega
W	Canadian Car and Foundry; Waco
Y	Consolidated

CHAPTER 21

Recognition

IMPORTANCE OF RECOGNITION

The first requirement in warfare is the ability to distinguish friend from foe. Nowhere is this more difficult than in the air. Owing to the great speeds and heights attained by combat aircraft, recognition is frequently dependent on a momentary glimpse. Instant and accurate recognition of surface craft and mechanized ground equipment is also difficult due to varying conditions of visibility, distance and the similarity of Allied and enemy designs.

Before the war few realized the serious problems of recognition that the increasing dominance of air power would present. The existence of these problems was soon apparent when the casualties of the British Advanced Air Striking Force after two months in France amounted to:—shot down by the Germans: 8; shot down by the French: 9. In those days the only question asked was, "Is it in range?" Since then there have been many serious mistakes in recognition on the sea, on land, and in the air. One of the worst of these occurred in the Sicilian campaign when our own gunfire destroyed more than 20 of our large planes and caused the loss of over 400 of our best men.

It is now fully realized that the only way to prevent these occurrences is by demanding the highest general level of proficiency in recognition throughout the services. This can be attained only by concentrated and continuous study. It is not suggested that practice will make one absolutely perfect, but it will certainly go a long way toward reducing the danger of firing on one's own comrades-in-arms or failing to fire in time on the enemy.

RECOGNITION PROBLEMS

The Navy's problem at sea, whether on warship or merchant ship, is to know as soon as possible whether any aircraft or ship within sight is friendly or hostile. If hostile, the type and probable method of attack must be known, in order to estimate the best method of defense and execute it in time.

Recognition problems are also important to the Army's ground forces. Anti-aircraft gunners should be able to recognize any aircraft within range, or likely to come within range, whether flying directly toward the battery or not. Columns on the move have to contend with low-flying attack-bombers or dive-bombers. Instant recognition saves lives and aids in the destruction of the enemy.

The Air Forces of both the Army and the Navy have perhaps the most difficult problems to solve because of the many viewpoints from which enemy aircraft must be recognized. The fighter pilot often spots his enemy from above and behind, but the underneath view is important too. The tail gunner generally gets the head-on view of an approaching enemy fighter. Photographic interpreters recognize dispersed aircraft by the top plane view or silhouette.

PRINCIPLES OF RECOGNITION

The first thing to be appreciated is that recognition does not begin and end with appearance. It is not only essential to distinguish between the appearance of friend and foe, but also to recognize and identify the exact type. In the case of aircraft, this identification includes knowledge of the wing span, approximate speed, armament and a reasonable deduction as to future actions of hostile craft. The situation is similar in the case of ships where recognition has a tactical value and includes knowledge of what the enemy can do and how he may be dealt with.

What enables a person to recognize aircraft, ships and mechanized ground equipment quickly and accurately? The process is no different from that of recognizing an automobile or a friend. When you see a friend coming toward you, recognition is instinctive because you are familiar with his total appearance—the combination of his features and distinctive mannerisms. In a similar way, aircraft and ships are recognized by "total form perception." After gaining a general knowledge of military equipment, the distinctive features and characteristics of particular ships and planes must be analyzed and studied before skill is acquired in total form perception. This is the groundwork for accurate recognition under combat conditions. Enthusiasm helps and is developed naturally when the seriousness of the problem is borne in mind. In the final analysis you are simply taking an interest in saving your own life.

RECOGNITION TRAINING

The ideal training in recognition would be to see actual aircraft, ships, and ground forces often enough to become entirely familiar with their appearance from all angles and under every condition of visibility. This is clearly impracticable and, therefore, various methods of recognition training have been developed. The general procedure is first to learn important items of ship and aircraft nomenclature and to become as familiar as possible with the general design features and operational uses of the principal types. The next step is analysis of the distinctive features by which to learn the distinction between Allied and enemy craft and types and models. The final stage consists of practice and should be continued not only through all stages of training, but also during all operations afloat or in the field.

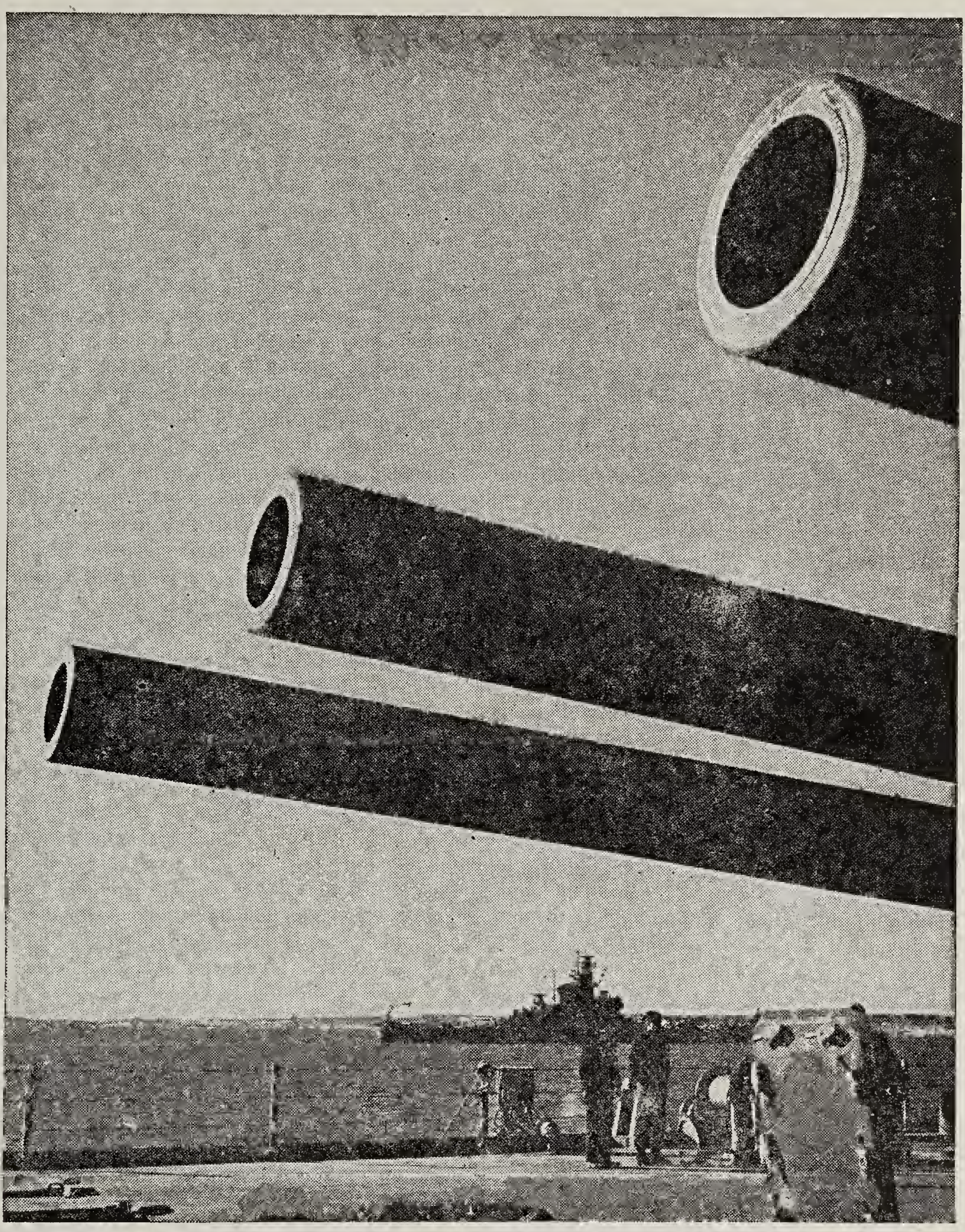
Silhouettes are the basis of all training recognition. The headon plan and side view silhouettes show every recognition feature of a ship or plane. To these basic diagrams form and detail may be added to increase reality. It should be remembered that under most conditions of visibility, ships and planes are recognized primarily by their silhouettes.

Motion pictures reproduce reality more closely than any other training medium. Training films are divided into three general types, corresponding roughly to the stages of training described above. The first type explains to the beginner the meaning of various words and phrases and familiarizes him with basic nomenclature. The second type of film deals with the recognition of individual types and presents detailed knowledge of various features. The third type shows actual views of various ships and aircraft seen from typical viewpoints under various conditions of visibility. This third type has been developed to allow for testing of individual ability in recognition.

Slides and film strips are a means of presenting silhouettes, drawings and still photographs to groups of trainees. As knowledge and ability increase, speed in recognition is developed by progressive reduction of the time of exposure on the screen. Slides and film strips are also an excellent means of testing ability. A "flash meter" method of projecting film slides has been developed by the Navy. Slides are flashed on the screen at increasing speeds up to 1/100th of a second. At such speeds, the trainee must recognize an object entirely from its "total form," since there is no time for the eye to scan its parts. This method holds the trainee's attention, since it has the elements of a game of skill.

Posters are valuable in constantly refreshing the memory and in bringing repeated attention to recognition problems. These should be displayed conspicuously and changed frequently enough to keep up interest.

Models have the advantage of being three-dimensional, as opposed to photographs and silhouettes. Accurate models should be displayed in such a way that individual trainees can examine them closely to check all features that may not have been fully understood in other methods of presentation.



PART 4

NAVY WEAPONS

CHAPTER 22

Small Arms

During recruit training you will have occasion to work with the United States Magazine Rifle and the Colt .45 caliber pistol. Each of these will be described in some detail as to operation and use.

THE UNITED STATES MAGAZINE RIFLE, MODEL 1903

This gun, referred to as the Springfield, is a magazine rifle of the bolt action type. Its magazine has a capacity of 5 rounds. Depending on the skill, position of the operator and visibility of the target, 10 to 15 shots per minute can be fired. Its use at ranges greater than 600 yards is unusual. The ammunition is ball and tracer.

Bolt mechanism.—Consists of the bolt sleeve, sleeve lock, extractor, extractor collar, cocking piece, safety lock, firing pin, firing-pin sleeve, striker and mainspring.

The bolt moves backward and forward, and rotates in the well of the receiver; it carries a cartridge, either from the magazine, or one placed by hand in front of it, into the chamber and supports its head when fired.

The sleeve unites the parts of the bolt mechanism. Lugs on the side of the sleeve are in contact with the receiver, preventing its rotation with the bolt.

The hook of the extractor engages in the groove of the cartridge case and retains the head of the latter in the countersink of the bolt until the case is ejected.

The safety lock when turned to the left is inoperative; when turned to the right, which can only be done when the piece is cocked, the point of the spindle enters its notch in the bolt and locks the bolt; at the same time its cam forces the cocking piece slightly to the rear, out of contact with the sear, and locks the firing pin.

Magazine mechanism.—The floor-plate follower, magazine spring and cut-off are included in the magazine mechanism.

To charge the magazine, see that the cut-off is turned up, showing on; draw the bolt fully to the rear, insert the cartridges from a clip or from the hand and close the bolt. To charge the magazine from a clip, place either end of a loaded clip in its seat in the receiver and, with the thumb of the right hand, press the cartridge down into the magazine until the top cartridge is caught by the right edge of the receiver. The manner in which the cartridges arrange themselves in the magazine and the position of the follower and compressed magazine spring are shown in the cross-section drawing, figure 22-2. The cartridge ramp guides the bullet and cartridge case into the chamber.

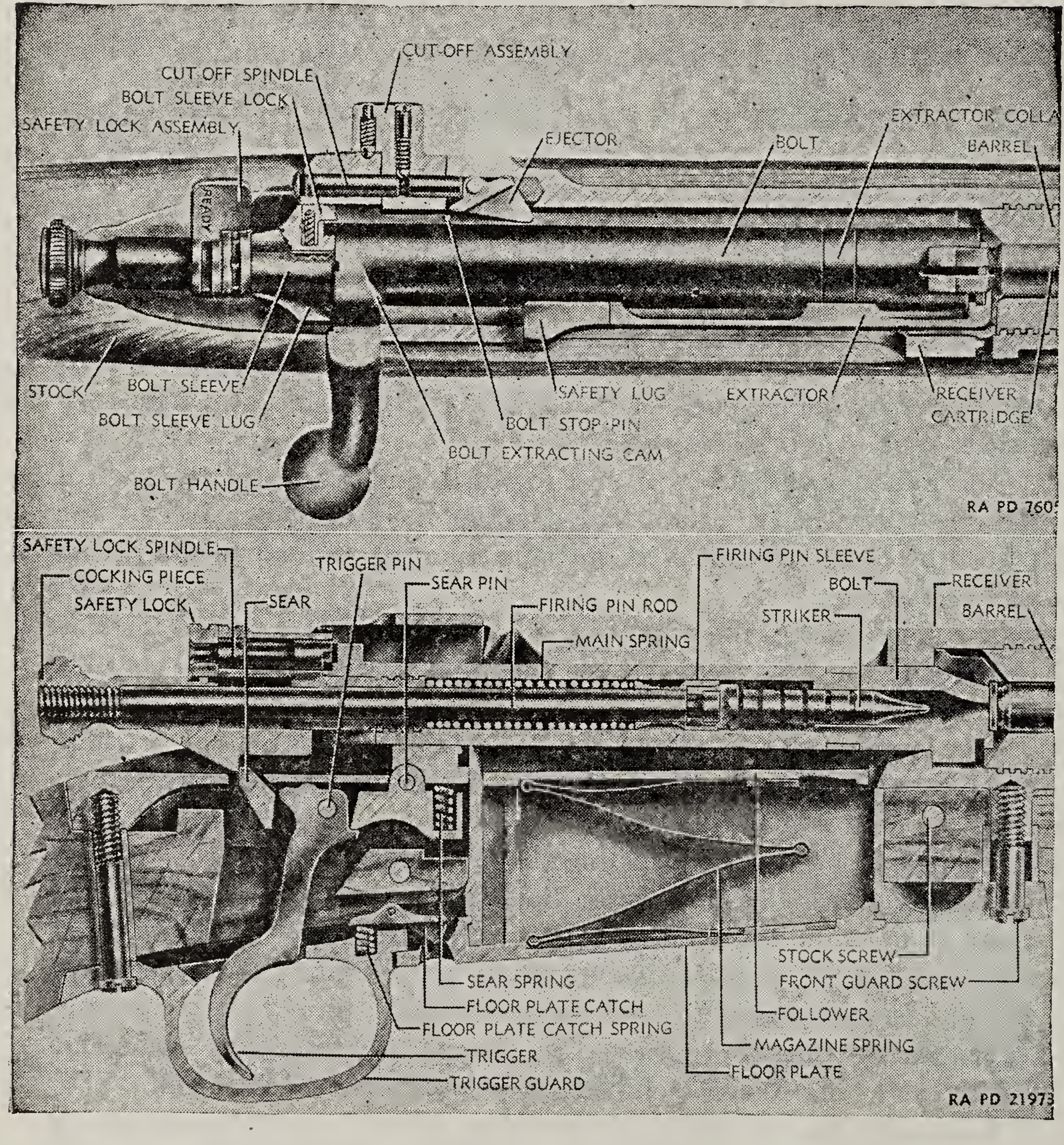


FIGURE 22-1.—Bolt and magazine mechanism of the United States magazine rifle, model 1903A1.

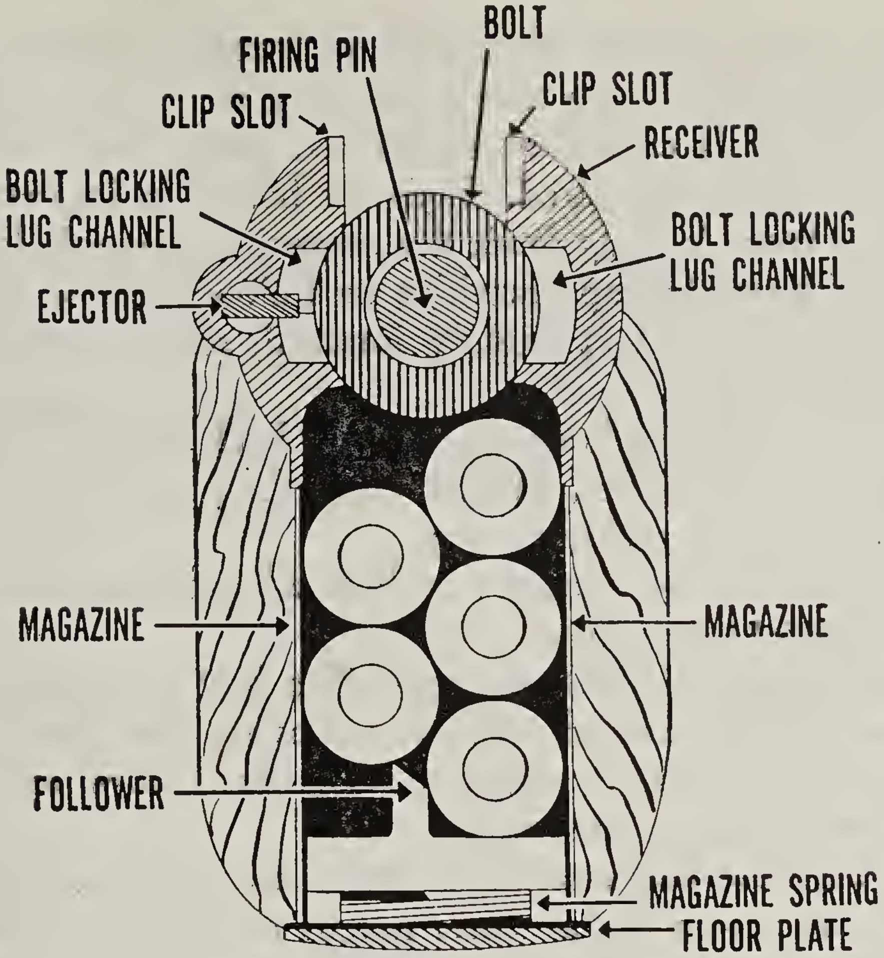


FIGURE 22-2.—Cross section of magazine, Springfield rifle.

The magazine can be filled by inserting cartridges one by one. Pushing the bolt forward, after charging the magazine, ejects the clip.

When the cut-off is turned down, the magazine is off. The bolt cannot be drawn fully back, and its front end projects over the rear end of the upper cartridge and holds it down in the magazine below the action of the bolt. The magazine mechanism then remains inoperative and the rifle can be used as a single loader, the cartridges in the magazine being held in reserve. The rifle can be used readily as a single loader with the magazine empty.

In magazine fire, after the last cartridge has been fired and the bolt drawn fully to the rear, the follower rises and holds the bolt open to show that the magazine is empty.

Precautions.—If carrying the piece cocked with a cartridge in the chamber, the bolt mechanism should be secured by turning the safety lock to the right. Under no circumstances should the firing pin be let down by hand on a cartridge in the chamber.

To obtain positive ejection and to insure the bolt catching the top cartridge in the magazine, when loading from the magazine, the bolt must be drawn fully to the rear in opening it.

When the bolt is closed or slightly forward, the cut-off may be turned up or down as desired. When the bolt is in its rearmost position, to pass from loading from the magazine to single loading it is necessary to force the top cartridge or follower below the reach of the bolt, to push the bolt slightly forward, and to turn the cut-off down, showing off.

In case of a misfire it is unsafe to draw back the bolt immediately, as it may cause a hangfire. In such cases the piece should be cocked by drawing back the cocking piece.

It is essential for the proper working and preservation of all cams that they be kept lubricated.

Dismounting and assembling.—The bolt and magazine mechanisms can be dismounted without removing the stock. The stock should never be removed except for making repairs, and then only by a selected and instructed man.

To dismount the bolt mechanism there are three steps:

1. Place the cut-off at the center notch; cock the arm and turn the safety lock to a vertical position, raise the bolt handle and draw out the bolt.

2. Hold the bolt in the left hand, press the sleeve lock in with the thumb of the right hand to unlock the sleeve from the bolt, and unscrew by turning to the left.

3. Hold the sleeve between forefinger and thumb of the left hand, draw the cocking piece back with the middle finger and the thumb of right hand, turn the safety lock down to the left with the forefinger of the right hand. This allows the cocking piece to move forward in the sleeve, thus partially relieving the tension of the mainspring. With the cocking piece against the breast, draw back the firing-pin sleeve with the forefinger and thumb of the right hand and hold it in this position while removing the striker with the left hand. Remove the firing-pin sleeve and the mainspring; pull the firing pin out of the sleeve; turn the safety lock thumb piece to the right on the sleeve and draw it to the rear through the groove made in the sleeve for this purpose. Turn the extractor to the right, forcing its tongue out of its groove in the front of the bolt, and force the extractor forward and off the bolt.

To assemble the bolt mechanism there are three steps:

1. Grasp the rear of the bolt, handle up, with the left hand. Turn the extractor collar with the thumb and forefinger of the right hand

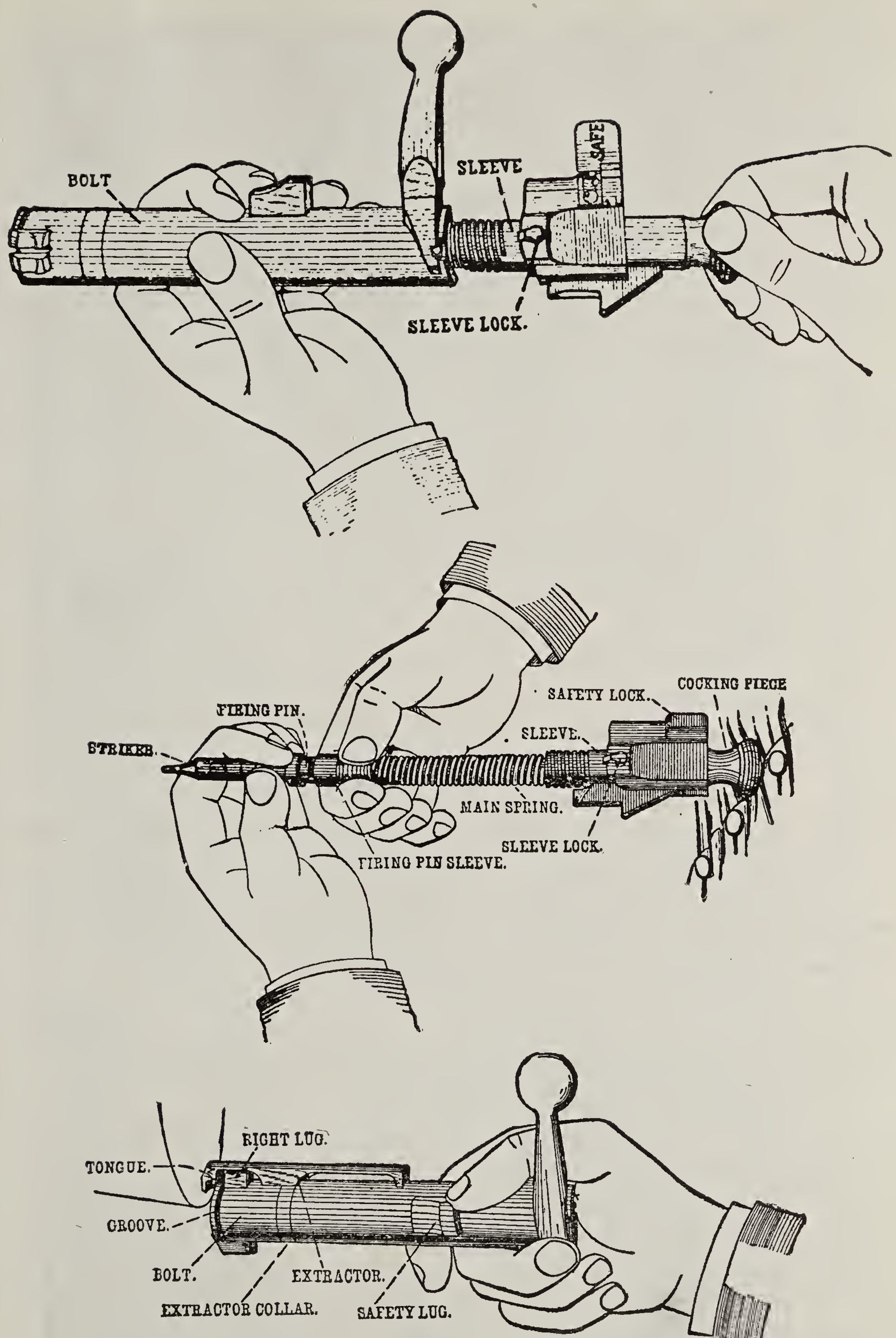


FIGURE 22-3.—Dismounting bolt mechanism.

until its lug is on the line with the safety lug on the bolt. Take the extractor in the right hand and insert the lug on the collar in the undercuts in the extractor by pushing the extractor to the rear until its tongue comes in contact with the rim on the face of the bolt. A slight pressure with the left thumb on the top of the rear part of the extractor assists in this operation. Turn the extractor to the right until it is over the right lug; take the bolt in the right hand and press the hook of the extractor against the butt plate, or some rigid object, until the tongue on the extractor enters its groove in the bolt.

2. Place the safety lock, through the dismounting groove, into position on the sleeve and turn it down to the left to permit the firing pin to enter the sleeve as far as possible; place the cocking piece against the breast and put on mainspring, firing-pin sleeve and striker. Holding the cocking piece between the thumb and forefinger of the left hand, draw the cocking piece back with the thumb and middle finger of the right hand, and turn the safety lock to a vertical position with the forefinger of the right hand; insert the firing pin in the bolt and screw up the sleeve (by turning it to the right) until the sleeve lock enters its notch on the bolt.

3. See that the cut-off is at the center notch; hold the piece under floor plate in the fingers of the left hand, the thumb extending over the left side of the receiver; take bolt in right hand with safety lock in a vertical position and safety lug up; press rear end of follower down with left thumb and push bolt into the receiver; lower bolt handle; turn safety lock and cut-off down to the left with right hand.

To dismount the magazine mechanism:

1. With the bullet end of a cartridge, press on the floor plate catch through the hole in the floor plate; at the same time draw the bullet to the rear. This releases the floor plate.

2. Raise the rear end of the first limb of the magazine spring high enough to clear the lug on the floor plate and draw it out of its mortise; proceed in the same manner to remove the follower.

To assemble the magazine mechanism:

1. Assemble the magazine spring and follower to floor plate, reversing the operation of dismounting.

2. Insert the follower and magazine spring in the magazine; place the tenon on the front end of the floor plate in its recess in the magazine; then place the lug on the rear end of the floor plate in its slot in the guard. Press the rear end of the floor plate forward and inward at the same time, forcing the floor plate into its seat in the guard.

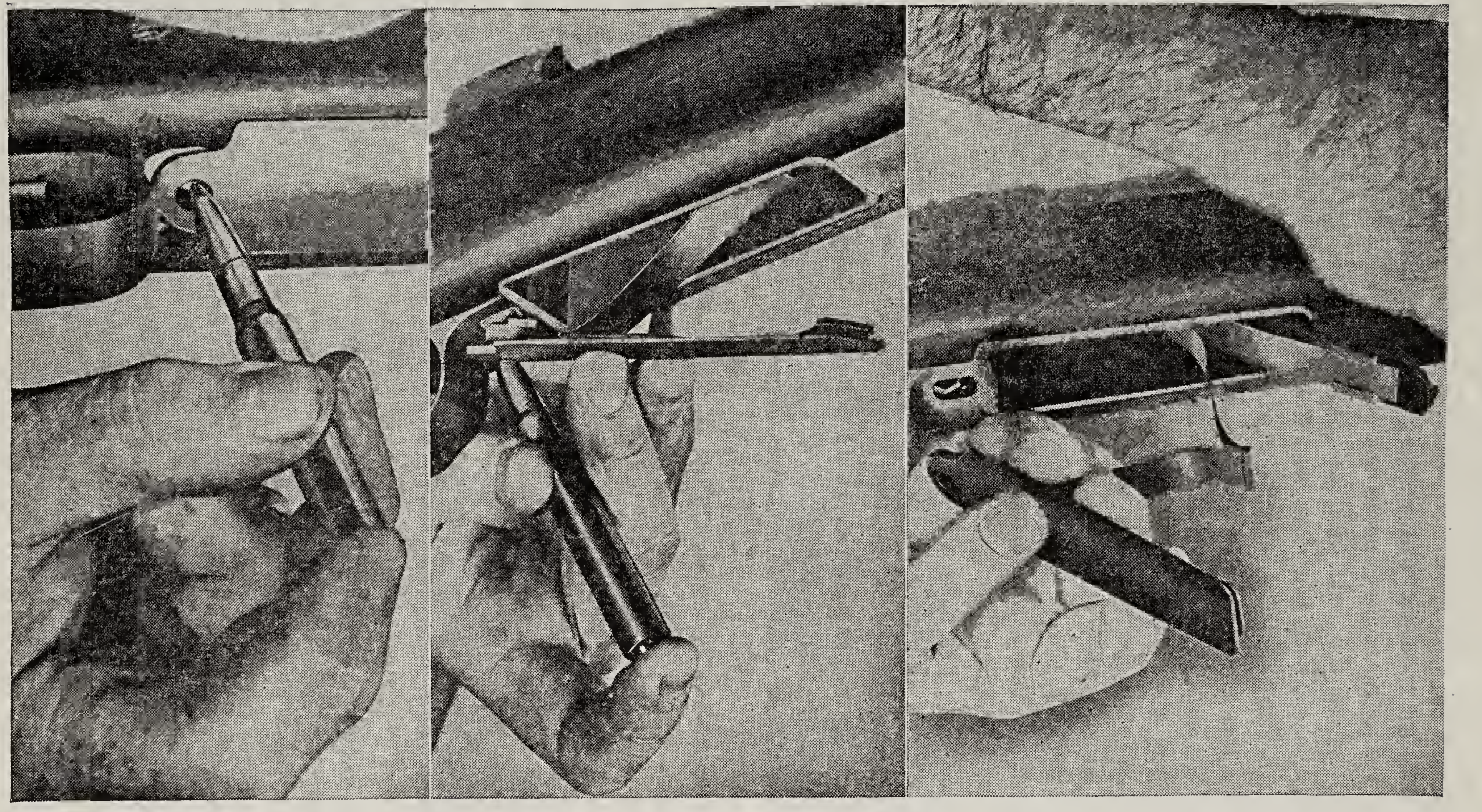


FIGURE 22-4.—Dismounting the magazine mechanism of the United States magazine rifle, model 1903A1.

Operation of the rifle.—Unless the bolt is drawn fully back the ejector will fail to work, and in magazine fire this will cause a jam.

When a misfire occurs, press the bolt handle well down, pull the cocking piece to the rear, and try again. Unless the bolt handle is fully down, the firing pin does not strike with full force. Almost all misfires are due to faulty operation of the bolt.

See that the guard screws are kept tight. Loose guard screws not only prevent good shooting but also interfere with the proper feeding of cartridges from the magazine, often resulting in a jam.

For practicing the motions of rapid fire with the rifle unloaded, turn the cut-off down or off; otherwise the bolt cannot be worked back and forth.

Fouling of the rifle bore.—The rifle is a weapon of precision and demands proper care and cleaning. A lack of care soon ruins its accuracy.

After a day's shooting the bore demands special attention, as the residuum from smokeless powder soon corrodes it and should be removed as soon as practicable. There are three kinds of fouling:

1. A black deposit, easily removed by oily rags.

2. An acid deposit which comes from the primer and is forced into the texture of the steel. This acid "sweats" out of the steel gradually, and, unless removed, causes rust. It can be best taken out by fresh water and a bristle brush.

3. Metal fouling, caused by particles of the cupro-nickel jacket of the bullet adhering to the bore. Fouling of this type rarely occurs with the present ammunition. The removal of metal fouling is impracticable in the field, and may cause serious damage to the bore at any time if done by an inexperienced man.

Cleaning the rifle.—1. Remove the bolt and clean from the breech end. Never clean from the muzzle.

2. Clean the bore with the cleaning rod and a small piece of cloth about 1½ inches square; then lightly oil the bore with an oiled rag. The metal and working parts also should be cleaned with dry rags and then lubricated with a slightly oiled rag to prevent rusting and to grease working parts.

3. Only a small amount of light oil should be used. Any surplus oil makes the rifle disagreeable to handle and collects dirt and grit which finds its way into and around the bolt mechanism, and often flies back into the firer's face and eyes when he fires. The bolt handle should be dry and entirely free from oil; otherwise it is difficult to grasp the bolt firmly to operate it.

4. If available, a saturate solution of soda and water may be used to clean the bore, but the bore must be thoroughly dried with dry patches of cloth before oiling. The following mixture is also excellent for cleaning: Amyl acetate, 2 parts; acetone, 2 parts; gas-engine oil, 1 part. Dissolve the oil in the acetate and add the acetone.

5. Whatever the method of cleaning, the bore should be cleaned daily for several days.

6. Cosmoline, machine oil, or any oil which will not rust the metal is suitable for oiling rifles. Sperm oil is the best for lubricating metallic bearing and contact surfaces; a somewhat heavier oil for the bore. Never use emery or any material which will scratch the metal.

7. The stock and hand guard may be coated with raw linseed oil and polished by rubbing with the hand.

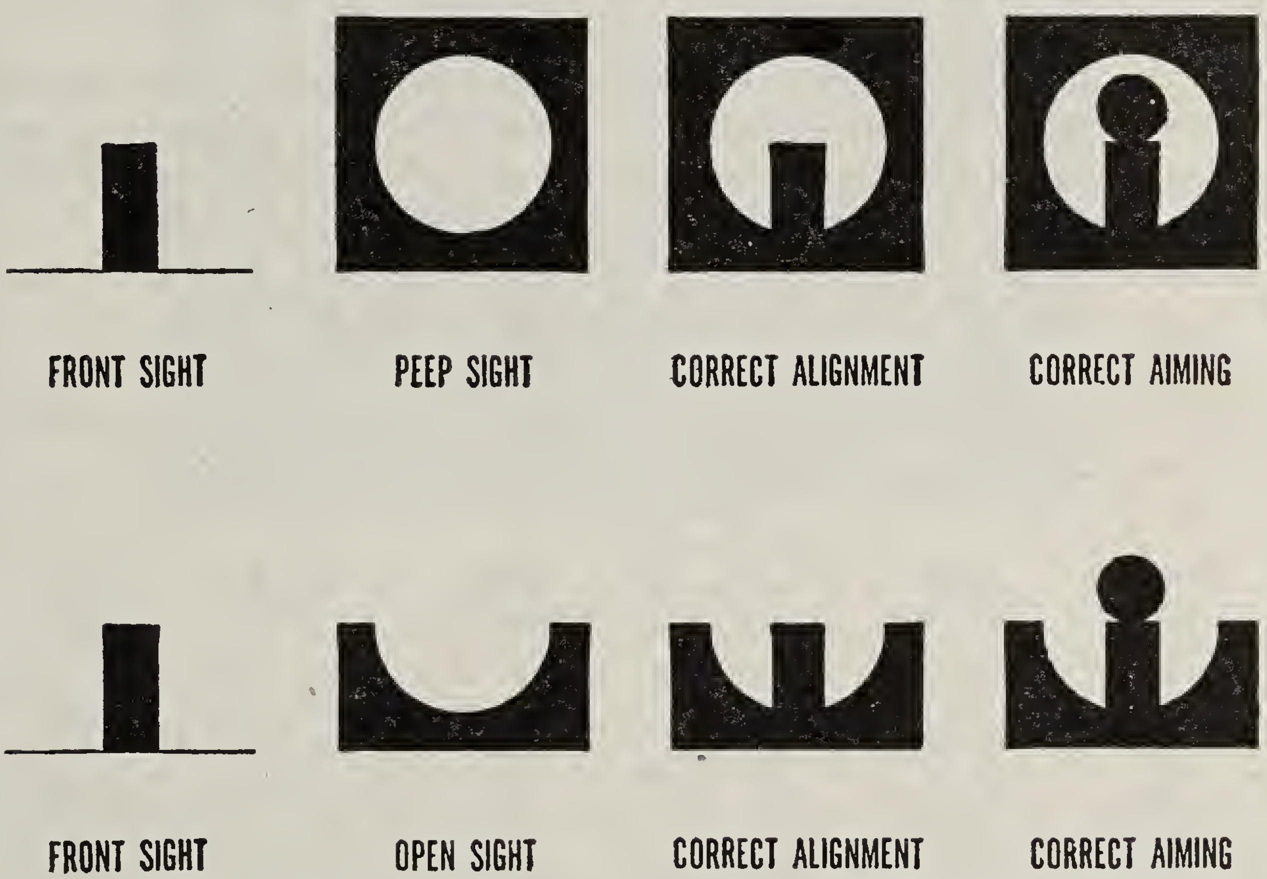


FIGURE 22-5.—Aiming with peep and open sights.

Aiming.—There are several different open-sight notches on the rear sight, but the peep sight is recommended for all firing.

In aiming, the eye should be held as close as possible to the peep. Aim at the target, keeping the top of the front sight centered in the peep hole. When the bull's-eye appears ill-defined or so small as to be covered by the front sight, the target should appear to rest on the top of the front sight, as in the illustration. When the bull's-eye is so close as to appear large, the desired point of impact should be visible just above the top of the front sight.

With any open sight, always aim so that the front sight is centered in the rear-sight notch and just fills the notch, i.e., is just even with the top of the rear-sight notch. Then aim at the point it is desired to hit, or if the target is small, let it rest on top of the front sight in the manner explained for the peep sight.

The battle sight (open sight with sight leaf down) is the only kind of open sight which, because of sudden and unexpected emergency in the field, may have to be used. The battle sight is ranged for 530 yards, and consequently shoots high at all ranges within this distance. Hence, with this sight, aim about 1 foot below the object at 300 and 400 yards, and 2 feet below at 200 yards; otherwise the shot will be high.

In firing at living targets except at very short ranges, aim should be taken at the bottom of the target. Thus, in aiming at a man at long range, at least half of the body of the man (if standing) should be seen resting on the front sight, or all if he is prone.

In firing at moving targets it will be necessary to lead the target in order to make a hit; otherwise the shot will fall behind.

The following table shows the approximate distance necessary to aim ahead of the body of a man or horse moving across the range at various distances and various rates of speed:

Distance (yards)	*Man walking*	*Man moving at double time*	*Horse walking*	*Horse trotting*	*Horse running*
100	Front edge	0.5 foot	Front edge of body	Front edge of body	Front edge of body
200	0.7 foot	1.7 feet	do	1.3 feet	1.3 feet
300	1.5 feet	3 feet	do	1.5 feet	3.8 feet
400	2 feet	4.4 feet	do	3.3 feet	6.5 feet
500	3 feet	6 feet	1 foot	5.3 feet	9.5 feet
600	4 feet	7.5 feet	2 feet	7.5 feet	13 feet

If the sights are bright, there will be a glimmer about them which interferes with accurate aiming. They should be a dead black. The sights are blackened by smoking them. A candle is the best thing to use; a match will do. Oiled rags which have been used to clean rifles make excellent smoke for blackening sights. Blacken both the front and rear sights. The black will not adhere to greasy metal.

Sight setting.—The marks opposite the peep indicate where the sight is to be set. The numbers on the sight leaf refer to the marks below the numbers.

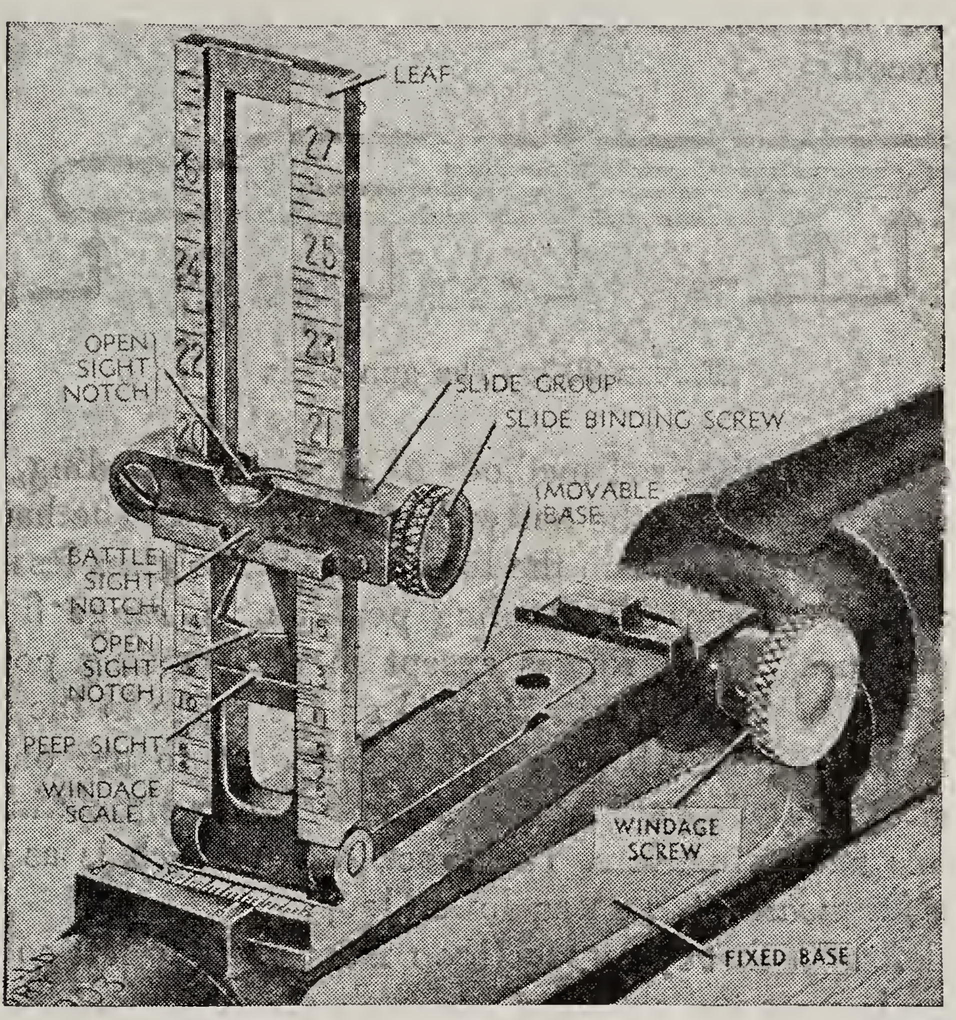


Figure 22-6.—The rear sight of the United States magazine rifle, model 1903A1.

The marks on the wind gage are called points. Changes in windage of quarter points may have to be made.

The bullet is carried in the same direction that the rear sight is moved. For example, if shots strike above and to the right of the bull's-eye, the elevation should be lowered and the windage set to the left. Winds carry the bullet to the right or left with them; therefore the windage is set to windward.

The elevation is not always set at exactly the actual range at which the firing takes place. With some rifles the elevation is set above the range, with others below it, and all rifles are not exactly true for windage. It is necessary to learn where the rifle you use actually shoots and to set your sights accordingly.

Sight setting must be practiced. Reading about it will not make you a good sight setter.

Holding the rifle.—The gun sling is of great assistance in shooting. It helps to steady the rifle, presses the butt of the rifle against the shoulder with the same amount of force for each shot, and reduces the recoil.

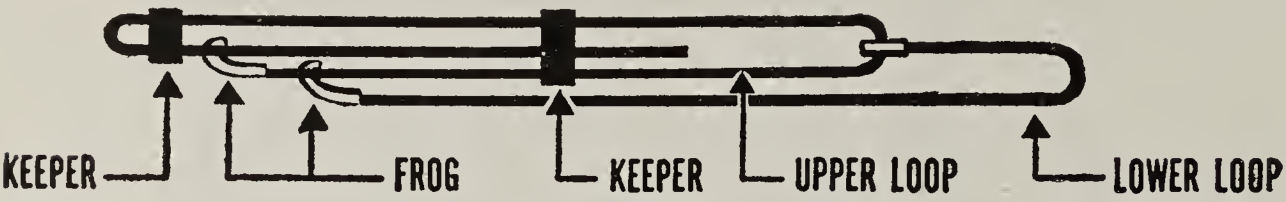


Figure 22-7.—The gun sling.

There are two authorized methods of adjusting the sling, (1) the loop adjustment and (2) the hasty sling adjustment. The hasty sling is more rapidly adjusted than the loop sling, but it gives less support in positions other than the standing position. In range firing, the loop sling is used at all ranges except in the standing position at 200 yards. The hasty sling will be used on the range in the standing position at 200 yards. All men will be required to use one or the other form of gun sling adjustment when firing or simulating fire in all problems and maneuvers. The procedure for each is as follows:

Loop adjustment.—1. Loosen lower loop.

2. Put left arm through upper loop from right to left so that the upper loop is near the shoulder and well above the biceps muscle.

3. Pull leather keeper down so that it will hold the upper loop in place.

4. Move the left hand over the top of the gun sling and grasp the rifle near the lower band swivel so as to cause the sling to be smooth along the hand and wrist.

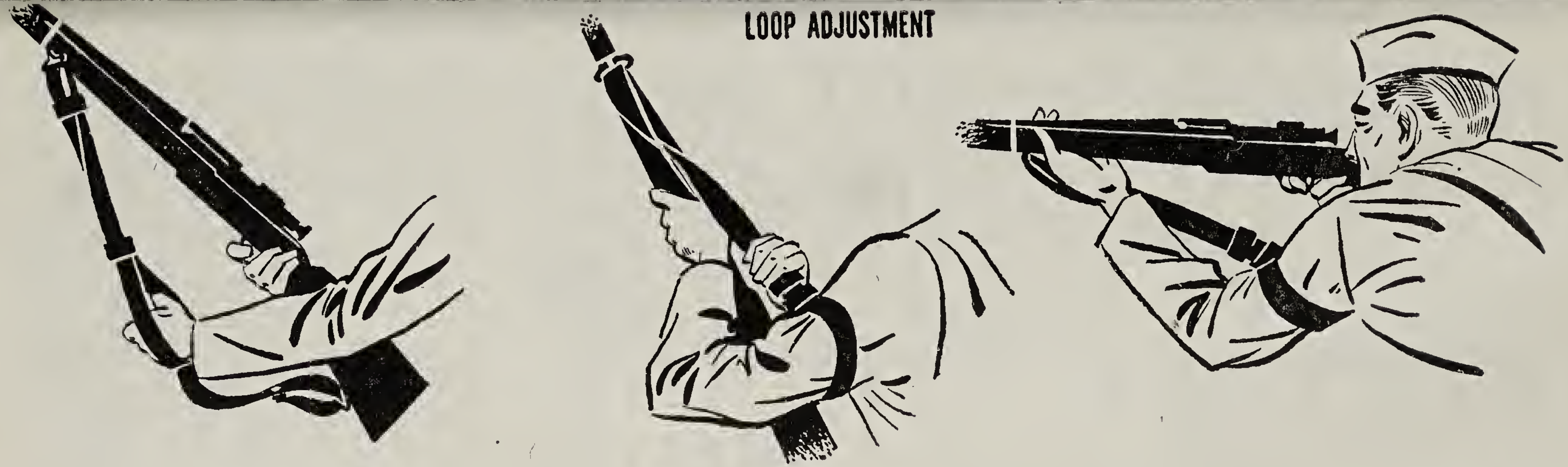
5. Lower loop, not used in this adjustment, will be loose enough to prevent any pull upon it.

Hasty sling adjustment.—1. Loosen the lower loop.

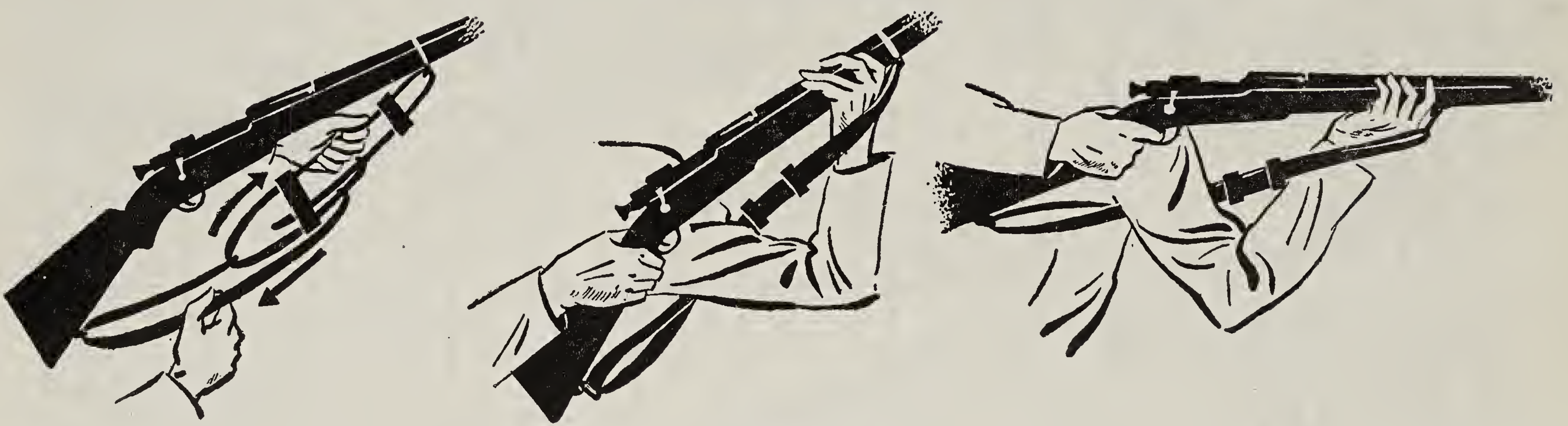
2. Grasp the rifle just at the rear of the lower hand swivel with the left hand and grasp the small of the stock with the right hand.

3. Throw the sling to the left and catch it above the elbow and high on the arm.

4. Remove the left hand from the rifle, pass the left hand under the sling, then over the sling, and regrasp the rifle with the left hand so as to cause the sling to be along the hand and wrist.



LOOP ADJUSTMENT



HASTY SLING ADJUSTMENT

FIGURE 22-8

The sling may be given one-half turn to the left and then adjusted. This twisting causes the sling to be smooth along the hand and wrist.

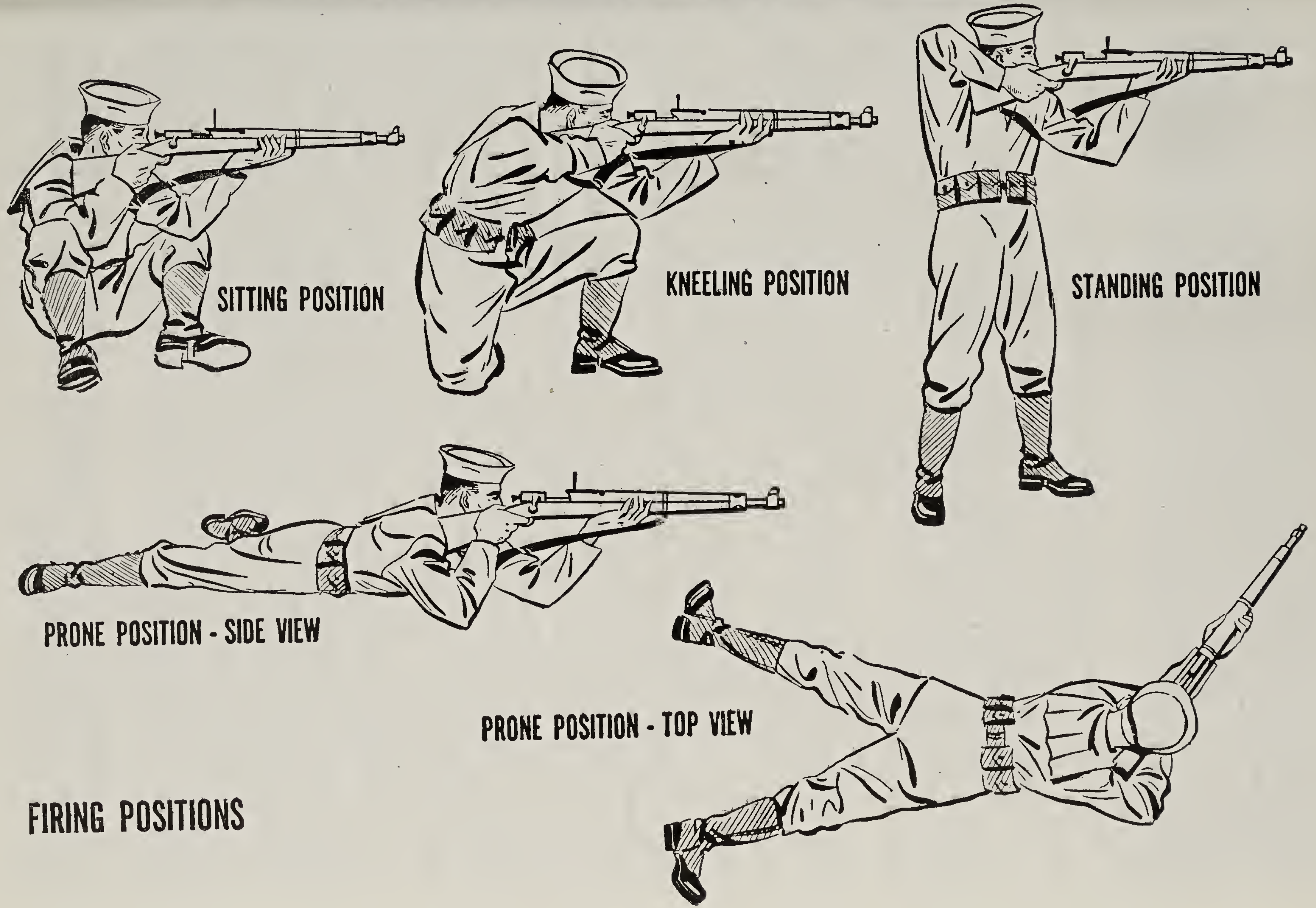
Standing position.—The firer stands half-faced to the right; feet from 1 foot to 2 feet apart; body erect and well balanced; left elbow well under the rifle; left hand grasping the rifle in front of the balance, rifle resting on the palm of the left hand; butt high up on the shoulder and firmly held, right elbow approximately at the height of the shoulder; cheek pressed against the stock and placed as far forward as possible without strain. A position with the left hand against or under the trigger guard and with the left arm supported against the body is not a practical field position and is prohibited in national matches.

The squatting position.—Both feet are flat on the ground and the buttocks clear of the ground. Bend the knees and lower the body, resting both elbows on the knees, the points of the elbows over the knees. This position is comfortable, steady, and quickly taken.

The kneeling position.—The right knee points directly to the right, i.e., along the firing line. The point of the left elbow is over the left knee. There is a flat place under the elbow which fits the flat place on the knee and makes a solid rest. Lean the body well forward. After practice the position ceases to be uncomfortable.

The sitting position.—This is useful in outpost service. There are several varieties of the sitting position; every man must find the one which fits him best. Inexperienced men sometimes find difficulty in adjusting themselves to this position, but with practice it becomes comfortable and steady. The legs must be at rest and the leg muscles not strained when aiming. Lean the body well forward and find a steady rest on the knees for both elbows.

The prone position.—Lie flat down at an angle of about 45 degrees to the firing line, spread the legs wide apart, and turn the heels inboard. Flatten the middle part of the body close to the ground. Place the point of the left elbow to the front and well to the right, then raise the right shoulder and, placing the right hand on the butt plate, put the butt of the rifle against the shoulder and flatten out again. Put the cheek or jaw hard against the small of the stock, the thumb of the right hand along the stock, and the right eye up to the firing pin, as close to the peep sight as possible. Let the right elbow spread out and, drawing the body back, get the chest and the whole body as flat on the ground as possible. The left elbow must be directly under the rifle. The right elbow is moved out to raise the muzzle and



FIRING POSITIONS

FIGURE 22-9

in to lower it. Now the rifle cannot kick. The only recoil will be of the whole body, which will not be felt.

Artificial rests.—There are several aids in holding a rifle. In the standing position, a tree or post may be used. Shoot from the right of the post, resting the arm against the post. In firing from behind a parapet, any of the positions mav be used, depending on the height of the parapet.

General principles for firing in all positions.—1. Press the cheek hard against the stock.

2. Place the thumb along, and not across, the stock.

3. Never cant the rifle. Keep it plumb. If it is canted the least bit the bullet will strike in the direction of the cant.

4. Breathe out naturally and then do not breathe while aiming and squeezing the trigger.

5. If you aim too long you will become unsteady and your eyesight will get bad. Take the rifle from the shoulder, rest, and aim again.

6. Squeeze the trigger. There is a little slack in the trigger. When aiming take this up with the finger so that when you wish to fire you have only to increase the pressure of the finger.

7. Before firing, cock the rifle, and squeeze the trigger with the rifle unloaded. This will steady you down and get you better acquainted with your trigger pull.

8. Do not yank or pull the trigger; squeeze gently the whole small of the stock with the right hand. Let the trigger off as easily as you can, and keep up the aiming while the gun is being discharged. Then you can tell where you are aiming when the bullet leaves the rifle.

9. Call the shot. As soon as you have squeezed the trigger and before the target is marked call out loud where you were aiming when the rifle was fired. A man who intends to call the shot will not shut his eyes when he squeezes the trigger nor will he quit aiming while he is squeezing the trigger. He will not flinch. Calling the shot is the best cure for flinching. Make up your mind to continue aiming while the rifle is being fired. Calling the shot will help you.

In rapid fire keep the butt to the shoulder. To load, lower the muzzle to the left and work the bolt, being careful to draw it fully back so it will eject the empty shell and not cause a jam. It will become easy after practice.

To reload from the prone position, with the rifle resting on a parapet, raise the right elbow well above the ground without removing the butt from the shoulder.

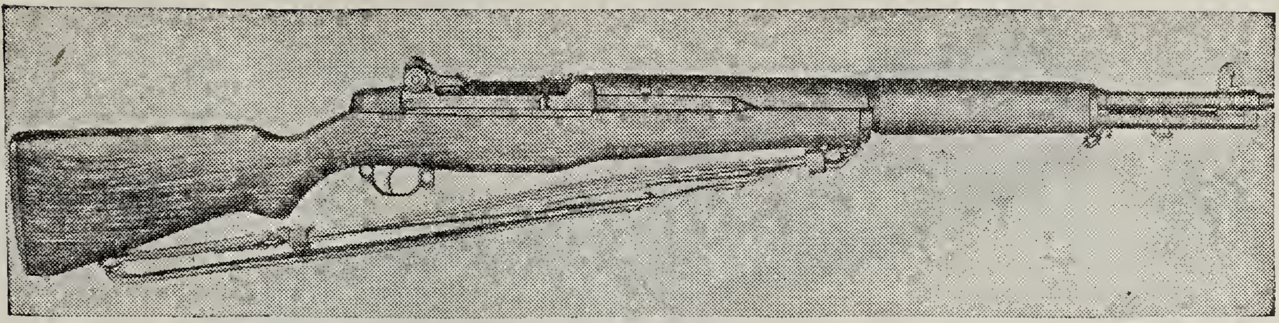


FIGURE 22-10.—The Garand rifle.

U. S. RIFLE, CALIBER .30, M1 (GARAND)

The Garand is semiautomatic; it fires once at each squeeze of the trigger, the gases from one shot providing the force to eject the empty cartridge, cock the piece, and reload. Thus the rifle can be fired more rapidly than the bolt-operated M1903.

As pictured in figure 22-10, the rifle weighs about 10 pounds and is approximately 44 inches long. It is fed from a clip holding eight rounds of ammunition, and is air-cooled.

U. S. CARBINE, CALIBER .30, M1

U. S. Carbine, Caliber .30, M1, is a self loading shoulder gun. It is gas operated, magazine fed and air cooled. It weighs approximately 5 pounds. The gun is fed from a box type magazine having a capacity of 15 rounds. Muzzle velocity is 1900 feet per second.

Later models of the carbine are equipped with an adjustable sight, graduated from 100-300 yards in increments of 50 yards, and providing for windage. In aiming, the top of the front sight is seen from the middle of the circle and just touches the bottom of the bull's-eye.

THE COLT .45 CALIBER AUTOMATIC PISTOL

The Colt automatic pistol is fed from a magazine of 7 cartridges. It fires but once at each squeeze of the trigger. Ball cartridge ammunition is used. At 250 yards a bullet will penetrate white pine to a depth of 4 inches. This corresponds to a dangerous wound. The maximum range is approximately 1600 yards when the pistol is held at a 30° elevation. The pistol, of course, is only intended for use at short ranges.

To familiarize yourself thoroughly with the mechanism of the pistol it should be disassembled and assembled. This can be done without tools.

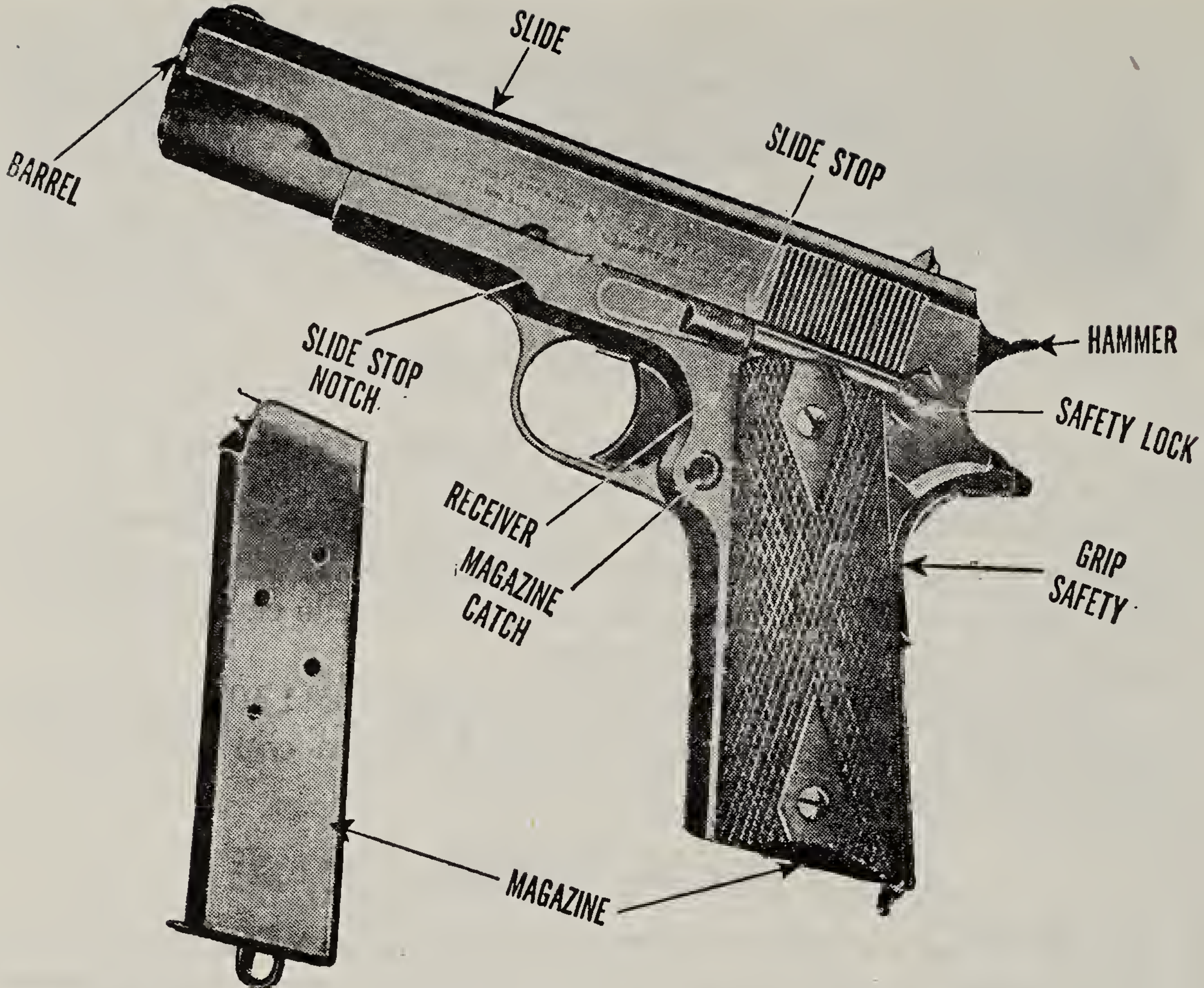


Figure 22-11.—Left side view of Colt .45 caliber automatic pistol, M1911, with slide in foremost position.

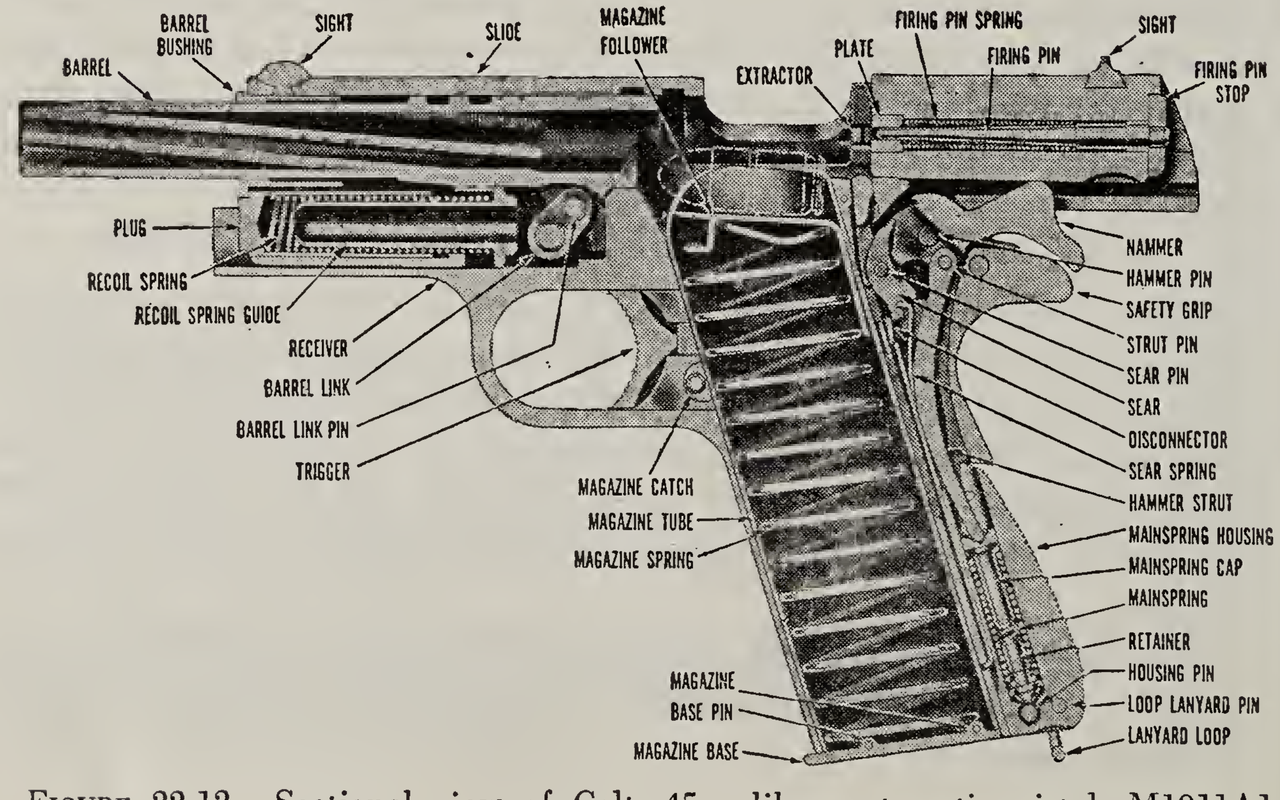


Figure 22-12.—Sectional view of Colt .45 caliber automatic pistol, M1911A1, with slide in rearmost position.

To disassemble.—Remove the magazine by pressing the magazine catch. Press the plug inward and turn the barrel bushing to the right until the plug and the end of the recoil spring protrude from their seat, releasing the tension of the spring. In carrying out this operation, the finger should be held over the plug to prevent it from jumping away; then it should be removed.

Draw the slide rearward until the smaller rear recess in its lower left edge stands above the projection on the thumb piece of the slide stop; press gently against the end of the pin of the slide stop which protrudes from the right side of the receiver above the trigger guard and remove the slide stop. This releases the link, allowing the barrel, with link and slide, to be drawn forward from the receiver in one piece. They carry with them the barrel bushing, recoil spring and recoil-spring guide. Remove these parts from the slide by withdrawing the recoil-spring guide from the rear of the recoil spring; then draw the recoil spring forward from the slide.

Turn the barrel bushing to the left until it may be drawn forward from the slide; this releases the barrel, which, with the link, may also be drawn forward from the slide.

Partial disassembling of the pistol, as indicated above, is all that is required ordinarily for proper care and cleaning. Only experienced men should be permitted to disassemble other parts of the pistol.

To assemble.—Assemble the parts in the reverse order from that given for disassembling.

Care and handling.—When the slide is in its forward position and the hammer is full cocked, push the safety lock up to lock the hammer.

The grip safety at all times automatically locks the trigger unless it is pressed in by firmly grasping the handle as in the firing position.

When the slide is drawn fully back to its rear position, and the magazine is empty, the slide stop automatically locks the slide in its open position; if the magazine is not empty and there is no jam, the slide when released will spring to its forward position unless it is locked by pressing the slide stop up into the recess on the slide.

When the pistol is fired and the slide remains open, it indicates either that the magazine is empty or that there is a jam. To relieve the jam it is often necessary to remove the magazine. To remove the magazine press the magazine catch. To load, charge the magazine with any number of cartridges from 1 to 7; insert the magazine into the hollow of the handle with a quick continuous movement until the click of the magazine catch is heard; then draw the slide fully back and release it, thus cocking the pistol and bringing the first cartridge into the chamber. The pistol is now ready for firing.

With the magazine empty, the pistol can be used as a single loader by drawing back the slide, inserting a cartridge in the chamber, and pressing down the slide stop to release the slide.

After the pistol is single loaded (and locked as a safety precaution), a filled magazine may be inserted; the pistol then carries 8 cartridges ready for use.

It is dangerous to carry the pistol thus loaded and, except in emergencies, the pistol should be carried with the chamber empty, unless otherwise directed by proper authority. When cartridges are in the magazine, to cock the pistol, to load the chamber, and to prepare for firing, it is only necessary to draw the slide fully to the rear and release it.

Pressure must be entirely released from the trigger after each shot in order that the trigger may re-engage the sear.

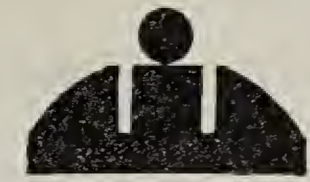
To inspect the pistol to see that it is unloaded or to unload it, keep drawing the slide to the rear and releasing it until it automatically remains in the open position, first making sure that it is not pointed in such a direction that an accidental shot would cause damage. If the pistol is loaded, each time the slide is drawn to the rear a cartridge will be ejected.

Pistol shooting.—When a pistol is first taken in hand, it should be examined to make sure that it is not loaded.

Both the front sight and the rear-sight groove should be blackened. When the pistol is aimed, the front sight should be seen through the middle of the rear-sight groove and the top of the front sight should be flush with the top of the groove. The part of the target at which to aim must be determined by practice. With most pistols at 25 yards the aim is usually taken at the bottom edge or in the bottom part of the bull's-eye, and at 50 yards in the center or in the upper part of the bull's-eye.

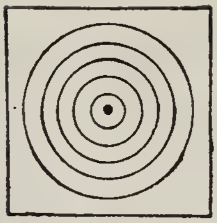
Grasp the stock of the pistol as high up as you can so that the barrel, hand and arm are as nearly as possible in one straight line. The thumb should be extended along the upper part of the frame. The second joint of the forefinger should be on the trigger.

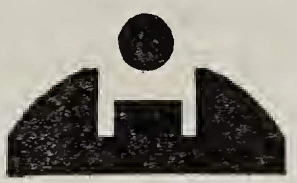
Start with a light grip and gradually squeeze with the whole hand, causing the trigger to yield gradually as the grip is tightened, and



Perfect alignment. Top of front sight level with top of rear. Equal line of light on either side of front sight in rear sight notch. Perfect shot.

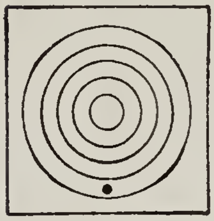
1

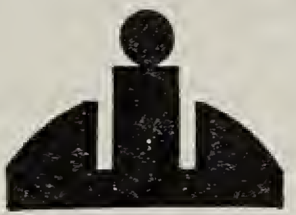




Front sight lower than top of rear, equal line of light on either side of front sight in rear sight notch. Shot too low.

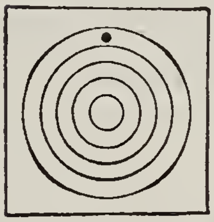
2

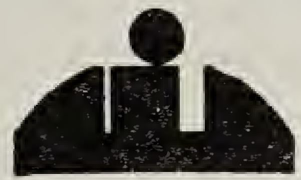




Top of front sight higher than top of rear, equal line of light on either side of front sight in rear sight notch. Shot too high.

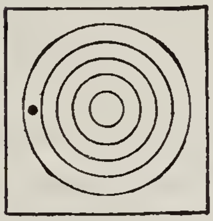
3

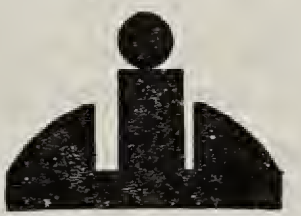




Top of front sight level with top of rear, too much light on right side of front sight in rear sight notch. Shot to left, 9 o'clock.

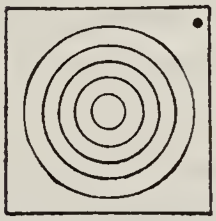
4

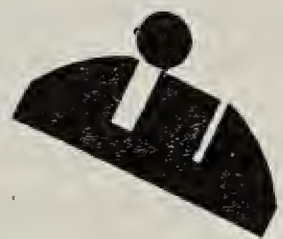




Top of front sight higher than top of rear. Too much light on left side of front sight in rear sight notch. Shot high and right.

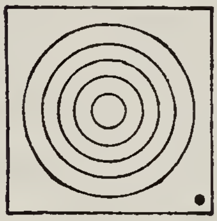
5

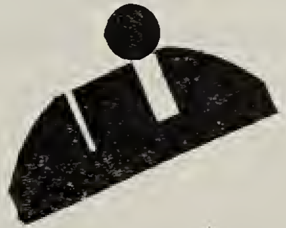




Top of front sight level with top of rear, too much light on left side of front sight in rear sight notch. Revolver "canted", shot low and right.

6





Top of front sight level with top of rear, too much light on right side of front sight in rear sight notch. Revolver "canted" shot low and left.

7

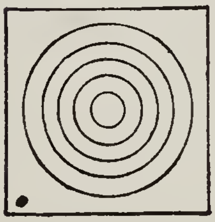


FIGURE 22-13.—Effect of correct and incorrect sight alignment, pistol and revolver.

continue squeezing without a jerk until the pistol fires. Decide to call the shot and to keep the right eye open.

If the hits are bunched to one side, they can be moved to the right by increasing the pressure of the thumb against the left side of the pistol or to the left by decreasing the pressure.

Snapping, i.e., aiming and squeezing the trigger with the pistol not loaded, is most valuable practice. No man should load and fire until he has snapped several times to get acquainted with the trigger pull of the pistol. Expert pistol shots do a great deal of snapping instead of a great deal of firing. Steady holdings can be acquired only by much snapping practice.

Positions.—In the prone position, the right elbow has excellent support on the ground. In the kneeling position, the firer may kneel on either knee. If kneeling on the left knee, the right knee affords an excellent rest for the elbow. In the squatting position, both elbows rest on the knees. In the standing position, face the target squarely, or nearly so; stand upright, not craning the head forward, and extend the arm to its full length.

Safety precautions.—1. Never point a rifle or pistol at anyone you do not intend to shoot nor in a direction where accidental discharge may do harm.

2. On leaving the firing line, open the chamber and keep it open.

3. Never leave a loaded rifle, or one with cartridges in the magazine, or a loaded pistol where it can be picked up by others.

4. Immediately upon taking up a rifle or pistol make sure by personal examination that it is not loaded.

5. On the firing line, if the rifle or pistol is loaded, keep it locked until you are ready to shoot, and do not turn around on the line with a loaded rifle or pistol in your hand.

6. Never carry the pistol in the holster with the hammer cocked and safety lock on, except in an emergency, or unless directed by proper authority.

7. Never put your trigger finger within the trigger guard until you intend to fire and the gun is pointed toward the target.

CHAPTER 23

Gunnery

Using guns, torpedoes and other ordnance material is called gunnery. As you continue in the Navy you will have gunnery drills to develop your efficiency in the use of Naval Weapons. If you become a member of a gun or fire-control crew you will receive intensive instruction to develop team work and cooperation. Training has been successful when each gun gets the maximum number of hits per minute.

Getting the maximum number of hits per minute depends on the rapidity of loading, sight setting, pointing and training.

LOADING

Loading large naval guns requires the cooperation of several men. Each member of the gun crew must know in general the duties of other members of the crew as well as every detail of his own responsibilities. Each man must perform his specific duty at exactly the right time, with great accuracy and speed.

SIGHT SETTING

The setting of the gun sights may be centrally controlled or may be handled by an individual sight setter depending on the type of gun and kind of vessel. Where gun sights are set by an individual stationed at a particular gun, the sight setter usually gets his instructions from the fire-control director on the ship. Under these conditions there is a plotting room from which information which has to do with control of the firing is sent to guns. This would include instructions on range and deflection. The sight setter must be trained to catch all instructions accurately over the voice tubes or telephones, and to put these on the sights exactly as received and with no loss of time. Most turret, broadside and antiaircraft guns are now controlled directly from fire control stations. Under these conditions, guns are said to be in automatic control, and gun sights are not used to put the guns on the target. The sights are manned by the pointer and trainer, but only as a check on the automatic operation, since the guns are driven and directed from the remote fire control station.

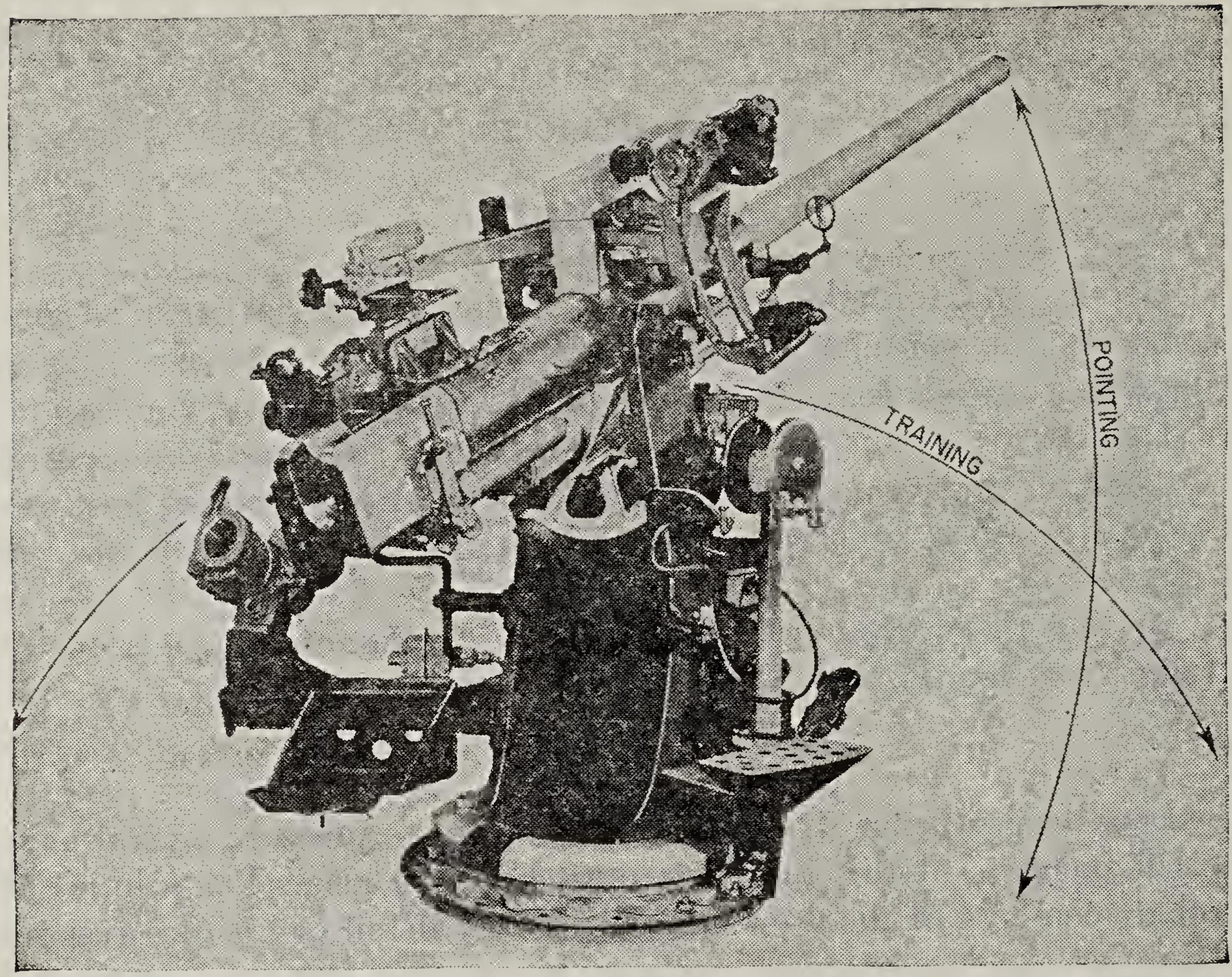


Figure 23-1.—Directions of movement in pointing and training.

The sights attached to the gun are used as an alternate system when the fire control station is out of order, when the guns are not functioning perfectly enough in automatic operation, or when battle conditions indicate that better results might be obtained by the use of local or manual drive. Whatever system is used, accuracy is all important. Only hits count.

As an aid in sighting, a spotter is used to estimate the distance shots fall over or short, and to the left or right of a target. His estimates are sent to the plotting room to be applied to the range and deflection to be sent to the guns. The spotter may be posted at a high point on the ship. Planes are now being used as stations for spotters. Their estimates are sent to the ship by radio.

POINTING AND TRAINING

Most guns, at the present time, have telescopic sights. In a telescopic sight there are two cross wires, a horizontal one and a vertical one. The aiming of the gun, when locally controlled, is done by

2 men, a pointer and a trainer. The pointer raises and lowers the gun; he moves it in elevation. The trainer positions the gun horizontally. It is his duty to keep the vertical wire of the sight on the target, while the pointer does the same for the horizontal wire. In local rather than automatic control, the pointer does the firing when the intersection of the cross wires is steady on the point of aim. This system of firing is known as pointer fire.

Not everyone can be a good pointer. Men are carefully selected for this work and receive extra pay, depending on their qualifications. A heavy gun pointer, first class, gets $5 per month additional pay.

Sometimes the term "gun-pointer group" is used. This includes the pointer, trainer and sight setter.

GUNS

The Navy uses many different types of gun depending on the purpose and conditions of operation. In the larger guns tremendous pressure is necessary to give projectiles the desired high muzzle velocity. This pressure is, of course, created by the propellant. Guns must be built to withstand this force which, in high powered guns, may be 18 tons per square inch. Because of its toughness, forged nickel or vanadium steel is used in the manufacture of guns for the United States Navy. For additional strength, guns larger than 6-inch are made in several layers. They are referred to as being "built up."

The interior of a gun barrel has a series of spiral grooves called rifling. These grooves give the projectile a whirling motion which causes its flight to be truer. The raised parts of the rifling are called the *lands*, and the depressions, the *grooves*.

Size of guns.—The caliber of a gun is its inside diameter, measured from the tops of the lands. In the United States Navy the size of a gun is given by stating its caliber in inches and its length in calibers. A 14-inch, 50 caliber gun would be one with a 14-inch diameter and a length of 50 times 14 inches or 700 inches. This system is not applied to guns smaller than the 3″/23. Three guns are referred to by their bore diameter alone. These are the 40 mm. (millimeter), 1.1″ and the 20 mm. Guns whose bore diameters are less than 1 inch are referred to by caliber alone, but in a different manner. For example, a .50 caliber gun is one whose bore diameter is 50/100's of an inch. Some guns of this type in use by the Navy are the Browning .30 and .50 caliber machine guns, the .30 caliber Garand, a semiautomatic rifle, the .30 caliber United States Magazine Rifle or Springfield and the .45 caliber Colt automatic pistol.

Classes of guns.—Guns are classed by calibers and by batteries They are divided by calibers into major-caliber, intermediate-caliber and minor-caliber guns. Major-caliber guns are 8-inch and above; intermediate-caliber are 5-inch, 6-inch, and 7-inch guns; minor caliber are 4-inch and smaller sizes, except for small arms.

A ship's guns belong to the main, secondary, or antiaircraft battery. On ships having turrets, the main battery consists of the turret group; on smaller ships the main battery includes all guns not designated as antiaircraft guns or assigned special duties. The secondary battery on major ships includes non-turret guns which are not installed for a special duty, as for aircraft defense, or depth-charge projection. The secondary-battery guns are frequently called broadside guns. The anti-aircraft battery is that series of guns whose primary duty is to defend the ship from aircraft attack.

Battleships mount the 16″/45, usually 9 in number, in 3 turrets. Two turrets are forward and one aft. These guns form the main battery of the ship and are mounted on the ship's center line. The battleship mounts as broadside or secondary batteries 5″/38 dual purpose guns in twin mounts. Full details of armament are restricted information. However, the newer battleships before the war carried 20 5″/38's, 10 to a side, as broadside batteries. In addition, battleships carry 40 mm., 20 mm., and .50 caliber guns wherever space can be found on deck for them.

The main armament of the aircraft carrier is, of course, its planes. In the past the carriers have mounted eight 5″/38's as a broadside battery and sixteen 1.1″ guns. This defensive armament has been greatly increased.

The heavy cruisers mount nine 8″/55 guns in three turrets, the turrets arranged like those of the battleship, as the main battery. Eight 5″/38 guns form the broadside battery; 40 mm. and 20 mm. guns are concentrated as heavily as possible.

Light cruisers in general carry twelve or fifteen 6″/47's as a main battery. They are mounted three to a turret with two or three turrets forward and two aft. One class of light cruisers carries sixteen 5″/38 guns in twin mounts, six turrets on the center line, three forward and three aft, and one twin mount on each side. The cruisers with the 6″/47 guns carry eight to twelve 5″/38's as a broadside battery. The ships mounting the sixteen 5″/38's use them as both main and broadside batteries. Both types of light cruiser carry 40 mm., 1.1″, 20 mm. and .50 caliber guns wherever possible.

Some destroyers carry 8 single mount 5″/38's. Others carry 4 or 5, two forward and two or three aft on the center line. Machine guns complete their armament.

Submarines are armed with one 3″/50 aft of the conning tower. One or two .50 caliber guns or 20 mm. guns are usually mounted on the conning tower.

Types of fire.—Guns used by the Navy have three types of fire: single, semiautomatic and automatic. Single fire guns are those in which, after firing, the breech must be opened by hand, a new round loaded, then the breech closed by hand, and the gun fired. The force of explosion is not utilized in any way except to trip the salvo latch (a mechanism which prevents the opening of the breech of a gun after loading until the gun has fired and recoiled). The major caliber guns are of the single fire type.

Semiautomatic guns are those in which the force of explosion opens the breech, ejects the fired cartridge case, and leaves the breech so that it closes automatically when another cartridge is properly inserted. The semiautomatic guns are the 6″/47, the 5″/38, and the 3″/50. For small arms there is a different definition of semiautomatic.

Automatic guns are those in which the force of the explosion is used to open the breech, eject the fired cartridge case, and load another cartridge. When ammunition is properly supplied no force other than pressure on the trigger is required for continuous fire. The automatic guns are the 40 mm., 1.1″, 20 mm. and .50 and .30 caliber machine guns.

There are a few other designations for guns which you will probably encounter. The term *small arms* includes rifles which may be fired from the shoulder and pistols which may be fired from the hand. A *saluting gun* is one which is normally used for firing salutes or as a signal gun. Saluting guns fire blanks and their size is usually designated by the weight of the projectile. A large ship might have a 3-pounder. A *line-throwing gun* is a short-barreled, *rifle-line gun* which is used to shoot a line across a space which is too great to permit the passing of a heaving line.

Parts of a gun.—There are a few major parts of a gun, which if known by name, will help in your study and drill on guns. An assembled firing unit consists of the gun proper and the mount. The gun carries the breech mechanism with firing lock, salvo latch and gas-expelling device. The mount carries the recoil brakes, the counter-

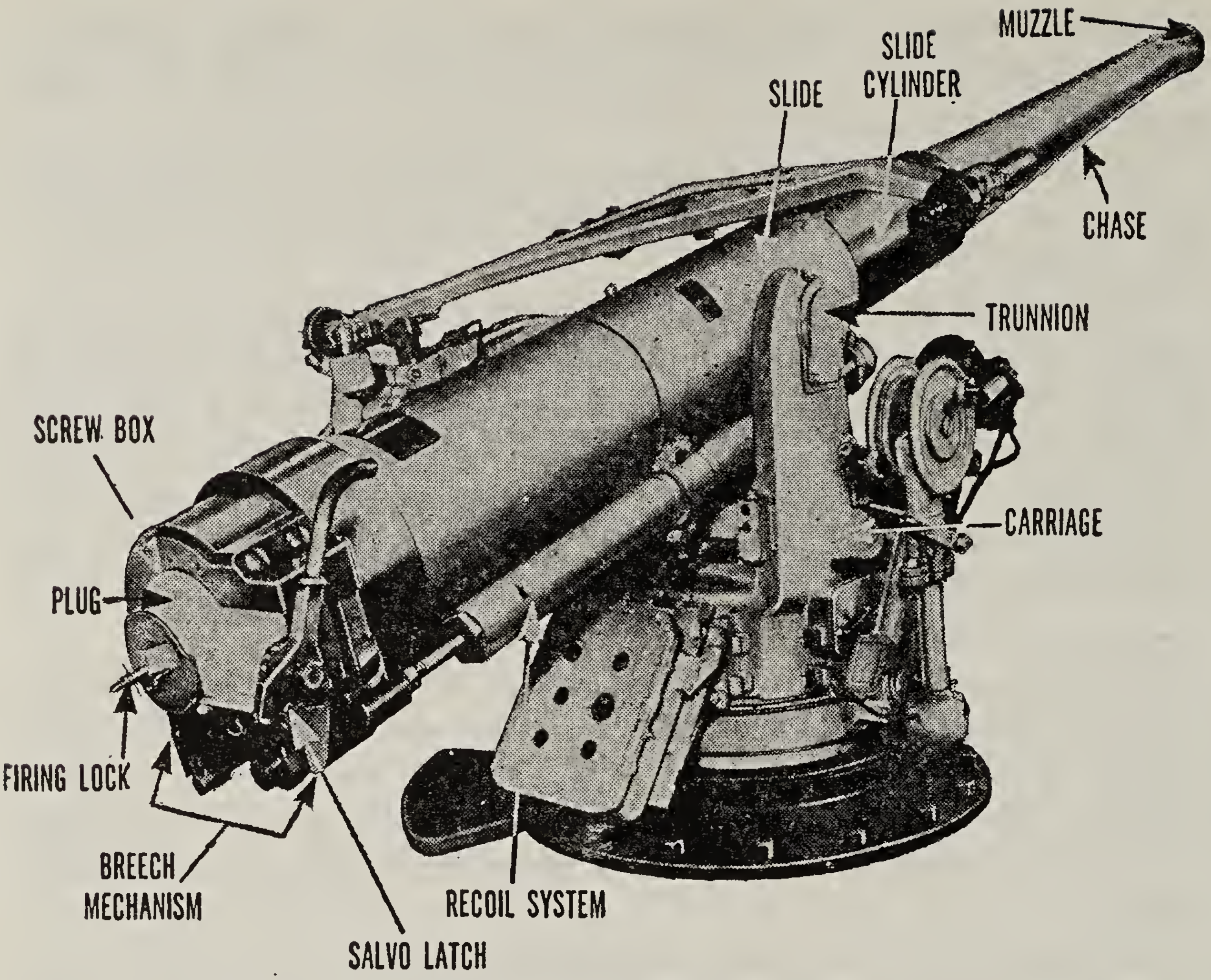


Figure 23-2.—Parts of a gun.

recoil system and the sights. The mount of a non-turret gun consists of the stand, carriage and slide.

The outside of a gun is divided into the breech, rear cylinder, slide cylinder, chase and muzzle. The inside of a gun is divided into the bore, chamber and screw box liner.

Bore	The opening inside a gun, from the after part of the rifling to the muzzle.
Breech	The rear end of the gun.
Breech Mechanism	The mechanical device for closing the rear end of a breech-loading gun.
Carriage	That part of the mount which supports the slide. It is supported by the stand and to it are secured the trunnion seats. On pedestal mounts, the carriage carries the training and elevating gear.
Chamber	The enlarged rear part of the inside of a gun; it is not rifled and is the part which holds the

	powder in bag guns and the cartridge case in case guns.
Chase	That sloping part of the outside of a gun between the muzzle and the slide.
Firing Lock	An attachment to the rear end of the mushroom stem fitted with a mechanism to eject primers, a firing pin for percussion firing, and connections for firing the primer by electricity. One type of firing lock is now supplied for all guns in the Navy which use separate ammunition.
Muzzle	The front end of a gun, from which the projectile is expelled.
Plug	A forged steel block fitted with stepped threads which fit into the threads of the screw-box liner. The pressure of the gases which force the projectile from the muzzle is just equal to the pressure which tends to force the breech block out of the breech; therefore, the breech block must be locked in place in the strongest possible manner. A sliding-wedge plug is used for closing the breech of some guns, and there are both vertical sliding wedges and horizontal sliding wedges. Another type of breech block is the sliding bolt, which is used with small arms. The bolt is pushed forward and a very strong arm sticking out at right angles to the bolt is turned down into a groove in the breech forging.
Recoil System	The movement of a gun to the rear, which is caused by the backward pressure of an exploding powder charge, is known as the recoil. If this recoil were not checked, the gun would move backward too far, and if an attempt were made to hold a large gun in a fixed position the strain on the mount would be too great; consequently, a recoil system has been developed. Most recoil systems are hydraulic and based on the use of plungers working in cylinders. When a gun has reached the end of its recoil, it is not in a position to be fired again; there-

	fore, a counter-recoil system, which will return it to battery, has been developed. This usually consists of springs, contained in cylinders, except that on the largest guns a pneumatic counter-recoil system is provided to assist the springs.
Salvo Latch	The salvo latch is secured to the breech of a gun and attached to the operating lever. It is installed to prevent a loaded gun from being opened, except with the full knowledge of the person opening it. The salvo latch is automatically released by the recoil, but a breech which has been closed cannot, under any other circumstances, be opened until the salvo latch has been tripped by hand.
Screw Box	This is the threaded part at the breach of a gun into which the plug fits. In loading a gun, care much be taken not to burr the threads.
Tampion	A plug with which the muzzle should always be closed when a gun is not in use.
Trunnions	Two cylindrical projections, one on each side of a gun. The gun is supported in the carriage by the trunnions and moves on them when elevated or depressed.

THE 3-INCH, 50 CALIBER, DUAL PURPOSE GUN

The 3″/50 is a minor caliber gun. It is a defensive weapon and called dual purpose because it is designed for defense against aircraft while the aircraft are still far away or very high up, and for work against light surface craft and submarines on the surface. The new destroyer escorts carry four 3″/50 guns, two forward and two aft on the center line; submarines are armed with one 3″/50 aft of the conning tower; and the older classes of destroyers have varying numbers.

The 3″/50 is supported by a pedestal type mount. Its maximum range is at least five miles and its ceiling around 21,500 feet. It fires a 13 pound projectile. The gun elevates 85° and depresses 10°.

Fixed ammunition is used and the projectiles may be common antiaircraft, high explosive, shrapnel or illuminating. Cartridges are

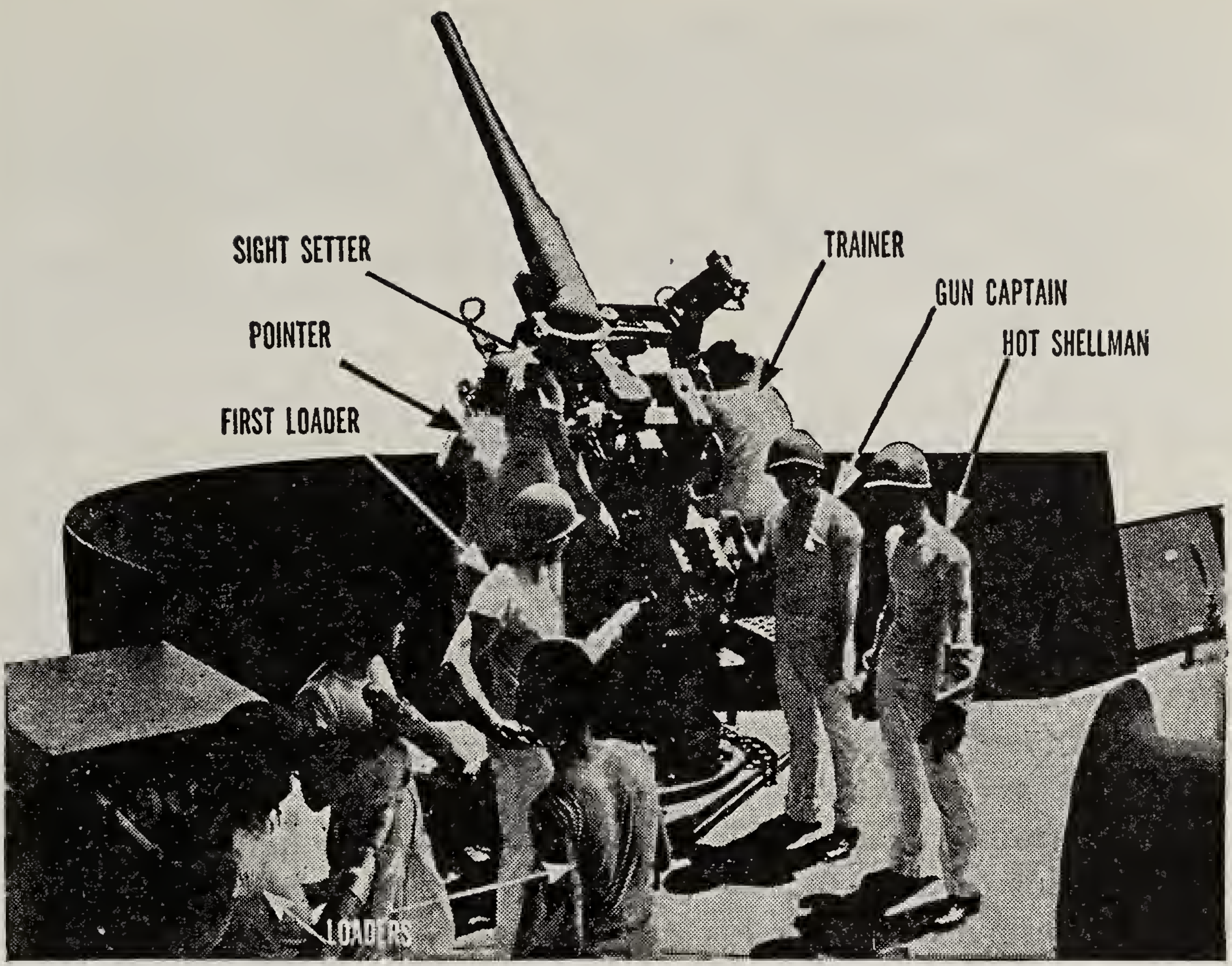


FIGURE 23-3.—Gun crew of the 3″/50 in position.

packed four to a box, the weight of a full box being about 125 pounds. Each cartridge weighs approximately 25 pounds.

Duties of the gun crew.—1. The gun captain acts as plugman. He operates the plug upon failure of the automatic feature of the plug to function. Responsible for the conduct, efficiency and spirit of the crew, he must realize that he is the representative of the battery officer and in absolute charge at the gun. Often detailed to conduct drills, he must know all about his gun, duties of each member of the crew, first aid, and action needed to meet all casualties. He is responsible for the safety of the gun and crew, and must report immediately any casualties or unusual conditions to the group-control officer and the battery officer. He is responsible for all gear at the guns and for the prompt and accurate execution of all orders received from the group-control officer. In manning the gun he performs as follows:

a. Reports through the sight setter to the group-control officer when the gun is ready.

b. Operates the plug as necessary.
c. Watches the gun to see that it completely returns to battery.
d. Watches the lock-plate locking device and sees that it is properly set; sees that the thrust cam is properly set and that the operating lever is disengaged from the shaft.
e. Calls, "Ready," to the pointer when the breech is closed after loading.
f. Recocks the gun in case of a misfire.
g. Replaces the firing mechanism as necessary.
h. In general, handles all casualties.

2. The pointer operates the elevating wheel to keep his horizontal wire on the point of aim and coaches the trainer to keep the vertical wire on the target. He fires the gun when the cross wires are steady on the point of aim. As supplementary duties he removes the sight caps, provides lens-paper, cleans the sights as necessary, examines the firing mechanism and sight lights, tests the elevating gear, attaches a lanyard to the sear bar and reports to the gun captain.

3. The trainer operates the training wheel to keep his vertical wire on the point of aim. In case of casualty to the pointer's sight, the trainer continues to keep his own vertical wire on the target and coaches the pointer to bring the horizontal wire on. When the cross wire is on the point of aim, the trainer sings out, "Mark," at which time the pointer may fire. In case either telescope is deranged and it is not known definitely which telescope is out, the pointer's telescope will be assumed to be the one which is correct, and the trainer will be coached on by the pointer. In addition, the trainer takes off the sight cap; cleans the sight and checks it as necessary; examines the night-sight lights and reports to the gun captain.

4. The sight setter sets the sights and transmits all communications between the gun and the group-control officer. He repeats all orders coming from fire control to the gun captain. He connects and tests the night-sight lights, breech lights, battle lanterns, telephones and voice tube. In addition, he reports to the pointer when the sights have been set, and examines the sights after each shot, resetting them if they have been jarred out of position.

5. The first loader is stationed in the rear and to the left of the breech, facing right, as close to the gun as safety will permit. He receives the shell from the second loader, holding it close to the breech parallel to the bore, above the path of the empty case on ejection. His left hand is placed under the cartridge case about at the

balance, his right hand on the base, fingers extended upward. He loads smartly by aligning the shell with the bore and following it home with the right hand, letting the breech block force the right hand upward in closing.

6. The second loader stands behind the gun and to the right of the first loader. He arranges shells on the deck in the rear of the gun in the probable arc of train. He picks up a shell with both hands around the middle, so that the first loader may receive it in position to load, and hands it to the first loader, the point toward the breech. When the gun crew is larger other loaders form a line to pass shells up to the first and second loaders.

7. The "hot shellman" stands in the rear and to the right of the gun. He catches empty cases on ejection and throws them clear of the gun.

Casualties.—1. *Misfires.*—The most frequent causes of misfires are: failure of the gun to return completely to battery, causing the trigger arm to fail to engage the sear bar; a broken firing pin; a weak spring. If the gun fails to fire, the pointer sings out, "Misfire." If the gun has failed to return completely to battery by not more than about 2 inches, the plugman sings out, "Fire by lanyard." If the gun is in battery, the plugman recocks it and calls out, "Ready." If the gun still fails to fire, plugman removes the firing pin and examines it, replacing spare parts when necessary.

2. *Failure to return to battery.*—If the failure is by not more than about 2 inches, the gun will be fired by lanyard. If by more than 2 inches, the plugman endeavors to jar the gun back to battery, using a heavy weight against the breech.

Marks should be painted on the shield to indicate to the plugman whether or not the gun has returned to battery.

3. *Block jams in closing.*—The plugman closes the block, using hand pressure on the bottom. If the block still fails to close, the shell is extracted, using the operating lever, and the bore is examined.

4. *Block jams in extraction.*—The empty case is removed by operating the block with the operating lever.

5. *Friction disks slipping.*—If the friction disks slip, allowing the breach to drop toward the deck, the friction disks are loosened, the breech raised to normal position by manpower, and set up on the disks again.

Preparing battery for exercise and securing.—The following are the steps in preparing a battery for exercise:

1. Clear away the gun. (Gun crews will remove and replace gun shutters at all times ordered.)
2. Take out tampion.
3. Lead out fire hose.
4. Test training gear, elevating gear, breech mechanism, firing mechanism, sights, night-sight lights, battle lanterns and breech lights, communications, ammunition hoists.
5. Take off friction disk caps.
6. Provide loader's gloves, bucket of drinking water, first-aid kit, recocking tool, lanyard (for firing in case gun fails to return completely to battery), large wrench, spare parts of firing mechanism, hand electric light, lens paper.
7. Communicate with magazine crews, test hoist signals and hoist. The gun cannot be regarded as fully ready until the ammunition supply is ready.
8. For general quarters leave the hoist cover down after testing hoist.
9. After firing or drill, swab out gun as necessary.

THE 5-INCH, 38 CALIBER, DUAL PURPOSE GUN

This gun operates semiautomatically after the first round has been fired. The breech is opened automatically on counter recoil of the gun and the case is extracted at the same time. The charge is loaded by hand and rammed hydraulically. It is fired either electrically or by percussion.

The 5-inch, 38 caliber has a horizontal range of 18,230 yards and a ceiling of 10,560 yards. It can be elevated 85° and depressed 15°. The rate of fire is more than 12 rounds per minute. On firing, the gun recoils 15 inches. Semi-fixed ammunition is used. The projectile weighs 54 pounds and the loaded case 28 pounds.

One class of cruisers carries sixteen 5″/38 guns in twin mounts; six turrets on the center line, three forward and three aft, and one twin mount on each side. Other cruisers with 6″/47 guns carry eight to twelve 5″/38's. However, the ships mounting the sixteen 5″/38's use them as both main and broadside batteries. Destroyers carry four or five single mount 5″/38's, two forward and two or three aft on the center line.

Like the 3″/50, the 5″/38 is a dual purpose gun. It is used for defense against aircraft while they are still far away and high, and for work against surface craft.

Duties of the gun crew.—In general the duties are very similar to those for the 3-inch, 50 caliber gun. However, there are several differences in the personnel of the crew.

Loading crew.—1. Gun captain—In rear of gun. Wherever possible he should have no specific or operational duties. He should direct the servicing of the gun and be trained and prepared to supervise its control in case there is no battery officer.

2. Rammerman—Right side. Operates the rammer control lever to ram the load.

3. First shellman—Left side forward.

4. First powderman—Left side rear.

5. Case stop operator—Right side rear. Drops the case stop immediately after ejection of the hot case, inspects the bore and announces, "Bore clear."

6. Second shellman, third shellman, etc., as necessary. Form a shell line to pass shells from stowage to the first shellman.

7. Second powderman, third powderman, etc., as necessary. Form a powder line to remove cartridge cases from the tanks and pass cartridge case to the first powderman.

8. Hot caseman—Rear of gun. Removes ejected cases from the vicinity of the mount. He must be cautioned to avoid being injured when the gun is firing at high elevation.

Pointer group.—1. Pointer—Left side on seat. Operates the elevating handwheels to keep the horizontal wire on the point of aim and normally fires the gun when the cross wires are steadied on the point of aim.

2. Trainer—Right side on seat. Operates the training handwheels to keep the vertical wire on the point of aim.

3. Sight setter—Right side on platform. Sets the sights as directed by the control officer and reports when the sights are set.

Control officer.—As desired. Estimates range, deflection (and fusesetting if air target) necessary to hit the target. Corrects range, deflection (and fusesetting) using standard spotting doctrine in order to maintain the mean point of impact of shots (bursts) on the target.

The control officer may be a battery officer designated for that purpose, but in many cases the gun captain will control the fire.

STANDARD COMMANDS FOR 3- AND 5-INCH GUNS

In the operation of both the 3-inch, 50 caliber and the 5-inch, 38 caliber guns the same commands are used. These cover all of the standard methods of primary and secondary control now in use. These commands and the interpretation of each should be familiar to all crew members.

ALL STATIONS REPORT WHEN MANNED AND READY—Command given by Control immediately upon control circuit being manned.

READY—Each gun (mount or turret) reports, "Ready," to Control as soon as there are sufficient personnel on station to fire a gun at a reduced rate by local methods. Control reports "Ready," to Conn as soon as one gun can be fired.

MANNED AND READY—Each station reports, "Manned and ready" to Control when the station has been placed in the fully ready condition, with sufficient personnel present to service the station using primary methods. Control reports, "Manned and ready," to Conn when all stations have reported.

TEST CIRCUITS—Means: test telephones, voice tubes, salvo signals, cease firing and firing circuits where applicable. Guns report "Circuits OK," if all circuits test properly; otherwise they report only those circuits which fail.

TEST TRANSMISSION—Directs the members of the control party responsible for signals transmitted from the director to the battery to test the accuracy of transmission thereof, including: elevation (auto and indicating), train (auto and indicating), sight setting, fuse-setting, battle order, shell order, shutter order.

RANGE—Set range in yards.

STATIONS—Ammunition parties prepare to send up or break out ammunition. Gun crews take their designated stations. Prepare to service the battery.

AIR (SURFACE) (LAND) TARGET—Directs preliminary dispositions for type of target indicated.

COMMON (HIGH EXPLOSIVE) (ILLUMINATING) PROJECTILE—Directs preparations to fire the type of ammunition indicated.

ACTION STARBOARD (PORT)—This is interpreted as a preliminary command by Conn or Control, used to position director and guns on the side designated, with ammunition distributed and ammunition train formed for rapid supply to the gun on that side. On this command cut in all stable elements and follow up, all guns (lights) match or shift to automatic remote control.

TARGET IS DESTROYER (AIRCRAFT) (SUBMARINE) BEAR-

ING—Conn must designate accurately by type and bearing the target it is desired to take under fire. In the same manner Control designates target to guns so that in case of necessity guns may be able to go intelligently to local control.

ON TARGET—Pointer reports to gun captain when on target.

LOAD—A command from Control or gun captain to trip salvo latches, open breech, and load with ammunition previously specified. This command may be omitted, in which case the action is taken at the command *COMMENCE FIRING.*

COMMENCE FIRING—A command from Control to load and open fire, given after trainer reports, "On Target."

CHECK FIRE—A command to discontinue fire, probably temporarily. All other functions of control party and gun crew continue. On this command sound cease firing gong (howler).

RESUME FIRE—A command to continue fire after check fire has been given.

CEASE FIRING—A command to stop the firing. On this command sound cease firing gong (howler). Gun captains report rounds of ammunition fired and condition of guns to Control.

AT EASE—A command given when it is desired to allow the men at stations to relax at their stations.

SECURE FROM GENERAL QUARTERS (SET CONDITION WATCH 1, 2, OR 3)—A command from Conn repeated by Control to secure or to set condition of readiness designated.

TAKE COVER—A command to gun crews to proceed to gun crew shelter on the double. Given when angle of elevation is such as to permit shell fragments falling on deck, or to avoid a spray gas attack.

REPEL DIVE ATTACK—A command to discontinue all other action, guns to go to designated sectors, and to open fire automatically in accordance with doctrine on any plane sighted in the assigned sector.

DROP DOWN—At this command all hands on deck drop down on their faces to avoid bomb fragments. The command ordinarily will be given only after aircraft have been observed to reach a bombing position, to have released their bombs, and just before the bombs reach the surface.

REPLACE AMMUNITION—A command to replace ammunition expended from ready racks, etc., and report completion.

REPORT CASUALTIES—During firing reports shall be made at once of any casualty that puts a gun out of action for an appreciable time or of any serious damage to or near the gun requiring immediate assistance for the safety of the ship. Detailed reports should be made as opportunity permits but communication channels should not be overloaded.

SILENCE—A command used in case of serious casualty or in case of doubt as to the seriousness of a casualty. On the command *SILENCE,* every member of the gun crew, director crew, ammunition party and all in the vicinity freeze in their tracks and remain there without noise or confusion until further orders are given or they hear the command *CARRY ON.*

CARRY ON—On this command normal service of the battery is continued from the point interrupted by the command *SILENCE.*

THE 6-INCH 47 CALIBER GUN

Five 6-inch 47 caliber triple turrets comprise the main battery of cruisers such as the *Brooklyn, Boise* and *Helena.* These guns have an enclosed turret mount and are located on the ship's center line, three forward and two aft. Together, they provide fire concentration of 15 guns on either beam, 9 forward, and 6 aft.

A hydraulic power drive, capable of functioning in automatic control, drives the gun in train and elevation. The 6″/47 fires semi-fixed ammunition to a range of 25,600 yards. Two types of projectile are used: common and armor-piercing. The common type is less expensive but will pierce only two or three inches of armor. More than 8 rounds per minute can be fired. The gun can be raised 41° and lowered 5°.

THE 20 MM. ANTIAIRCRAFT GUN

The 20 mm. antiaircraft gun is used for close range, high angle fire as an antiaircraft defense. Each is singly mounted on a pedestal and can be trained through 360° and elevated from minus 5° to plus 87°. The gun fires in automatic only. This means that the gun will fire as long as the trigger is pressed and there is ammunition in the magazine. The rate of fire is approximately 450 rounds per minute. The magazine has a capacity of sixty rounds. At 36° of elevation, the maximum range is approximately 5,500 yards.

Duties of gun crew.—The crew of three consists of a gunner, a trunnion operator and a loader. The gunner aims and controls the fire of the gun. He aids in cocking the gun; gets into the shoulder bars and fastens the strap; locates the target, tracks, and fires when

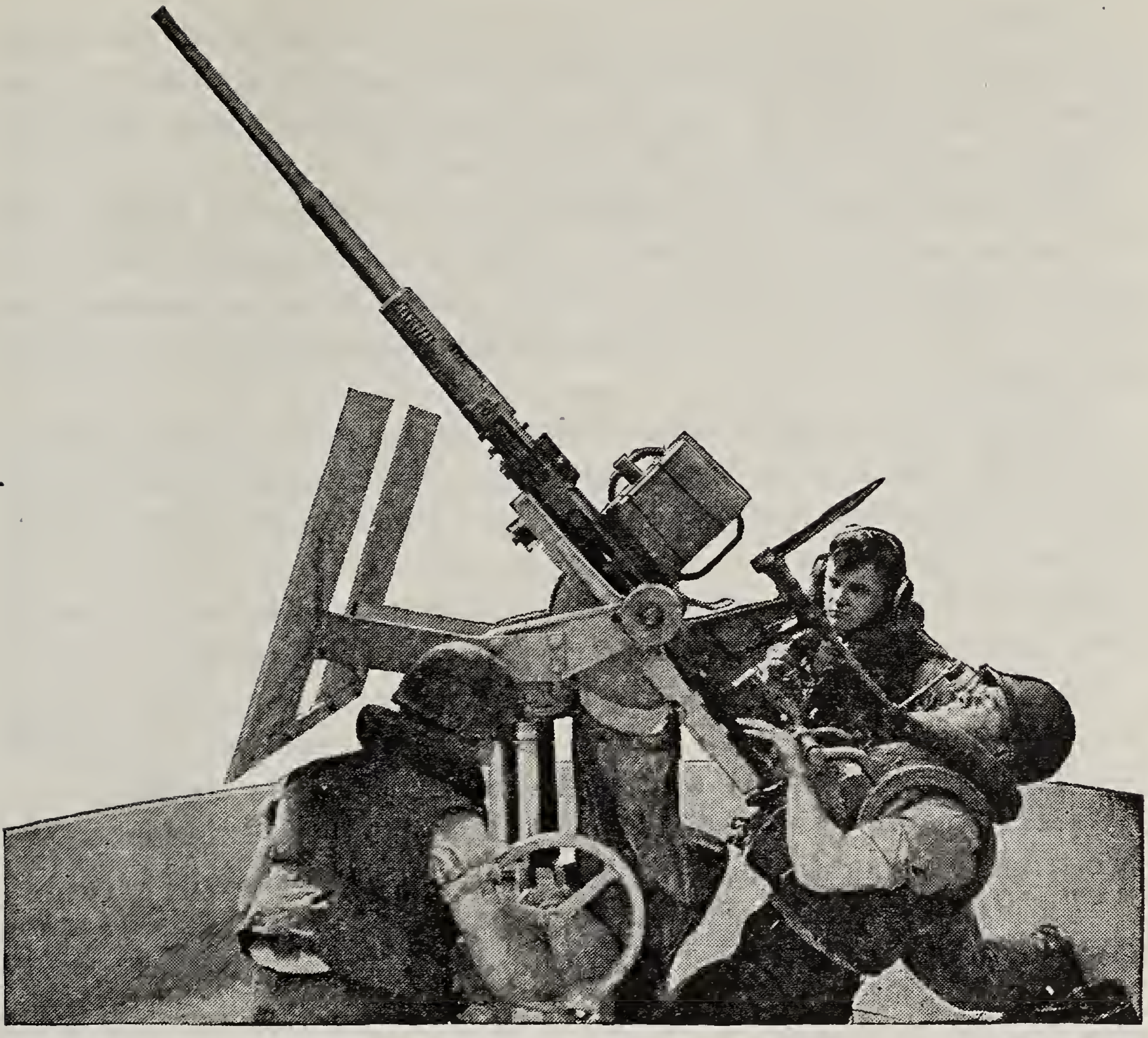


Figure 23-4.—The 20 millimeter antiaircraft gun and crew.

the target comes within range or as directed by the battery officer; and orders a change of empty or partially empty magazines when necessary.

In case of a stoppage, the gunner clears the gun and directs others in helping him do so. After firing he aids in uncocking and securing the gun. He may load cartridges into the magazine when he is not in action.

The trunnion operator, in preparation for firing, unlocks the cradle and the mount and assists in cocking the gun. He continuously adjusts the trunnion to the proper elevation by turning the column and raising the hand wheel as the gunner tracks the target and fires. He watches the gunner's knees to obtain cues for raising and lowering the column. By checking the proper seating of the magazine on the breech casing, he aids the loader.

In case of a stoppage, the trunnion operator helps in uncocking the gun. He performs other duties which may be assigned by the gunner. After firing he aids in securing the gun. He may load cartridges into the magazines when not in action.

The loader keeps the gun supplied with ammunition by loading full magazines onto the breech casing of the gun at rates up to one every eight seconds under continuous firing. During firing he observes the magazine to see when it is empty and immediately replaces it with a full magazine.

He may perform other duties assigned by the gunner. Before action occurs, the gunner may break out ammunition, grease it, and load it into the magazine, applying the proper spring tension. After firing, he aids in uncocking and securing the gun.

Duties of the crew on various commands.—On the commands listed below, crew members perform the duties indicated.

GENERAL QUARTERS—The gunner cocks the gun. The trunnion operator unlocks the cradle so that the gun may be elevated and depressed, takes his station, readies the gun and aids in cocking.

STATIONS—The gunner straps himself into the shoulder rests. The trunnion operator and the gunner take their positions.

STAND BY—The loader picks up the loaded magazine. The trunnion operator stands by.

HALF LOAD—The loader partially seats the magazine. The trunnion operator stands by.

LOAD—The loader fully seats the magazine, checks to see that it is properly seated, removes his hand from the magazine and watches it to note when it is empty or when a jam occurs. When the magazine is empty he removes it, lays it down, picks up another and repeats the loading operation. The trunnion operator stands by.

TRACK—The gunner elevates and trains the gun for the target. The trunnion operator continuously adjusts the column so that the gunner's knees are slightly bent.

COMMENCE FIRING—Prepares to fire. When the target comes within range and the gun is properly aimed he squeezes the trigger lever and holds it down until the magazine is empty or the target has passed, or he may fire in bursts of 3 to 5 seconds. The trunnion operator continuously adjusts the column and checks on the position of the magazine catch lever when the magazine is removed by the loader. The loader replaces empty magazines as necessary.

CEASE FIRING—At this command or when the ammunition is exhausted, the gunner releases the trigger. On *CEASE FIRING*, he turns the safe fire button to "safe," and unhooks the strap from the shoulder rest releasing himself from the gun. In combat he does not unhook the straps until so ordered by the battery officer. At the end of all firing the gunner may uncock the gun. The trunnion operator secures the gun.

Casualties.—1. *Magazine does not seat properly.*—The loader removes the magazine and reseats it.

2. *A jam or stoppage.*—The gunner unhooks the strap from the shoulder rest, releasing himself from the gun. He inspects the position of the breech. If the round is in the breech casing or chamber, he recocks the gun. If the round is in the chamber the loader removes the magazine, while the gunner eases the breech block forward to firing position and points the gun in a safe direction. If the round cannot be fired, the barrel is removed and cooled. The gunner replaces the barrel with a new one. The trunnion operator may help in this series of operations.

3. *A broken rear barrel spring.*—The gunner's mate eases the breech forward to the firing position, and with the help of the other members of the crew goes through the necessary steps to replace the spring.

4. *Casualties making it necessary to remove the breech mechanism.* —These may include such items as a broken striker, a broken parallelogram, or a broken sear spring. The gunner's mate with the help of the crew replaces needed parts.

THE 40 MM. ANTIAIRCRAFT GUN

This is an automatic gun mounted on destroyers and larger ships and is designed for use against aircraft. It operates in both single and automatic fire. It is water cooled, and comes in single, twin and quadruple mounts.

The barrel of the 40 mm. gun is 60 calibers long. It can be elevated from −15° to 90°. The gun has a muzzle velocity of 2790 feet per second. It has a horizontal range of 5420 yards, and a vertical range of 5400 yards. Usually it is not fired until the target is within 2000 yards. Shells are fed into the gun from clips of four, two of which are tracers. The shell explodes on contact, but also contains a self-destructive fuse. This is set to explode the shell after 11.5 seconds if it does not strike a target.

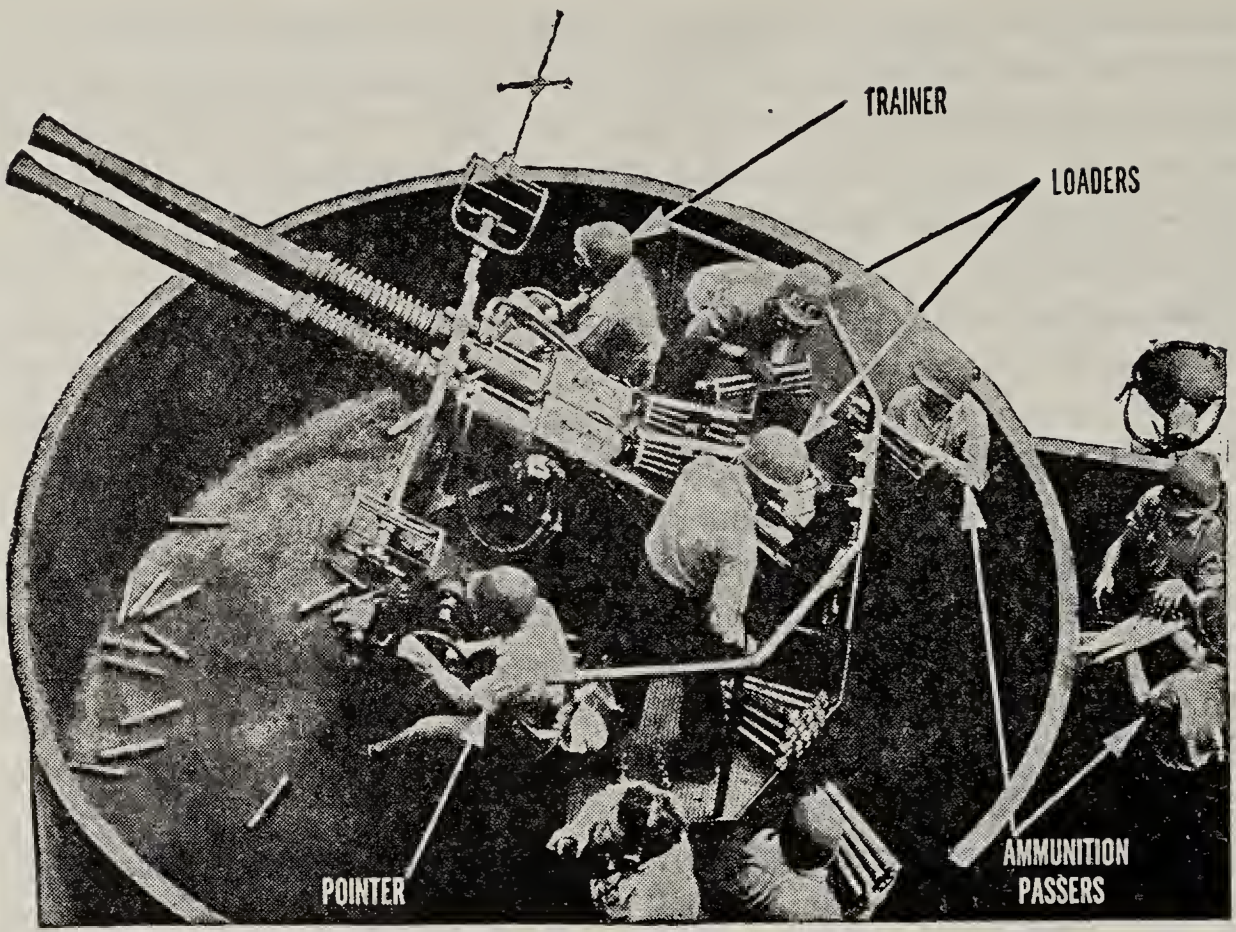


FIGURE 23-5.—The 40 millimeter antiaircraft gun and crew.

THE BROWNING .30 CALIBER MACHINE GUN

Another popular Navy gun is the Browning .30 caliber. It is mounted on shipboard for antiaircraft use, is part of the armament of some aircraft and is used against personnel. The .50 caliber Browning, because of its greater hitting power is replacing the .30 caliber for antiaircraft and aircraft uses. Since its range, 1000 yards, is relatively short, the gun is used against low-level aircraft attack. It fires 400 to 525 rounds per minute. The muzzle velocity, an important factor in armor piercing ability, is 2700 feet per second. This is the muzzle velocity of many Navy guns.

The Browning .30 caliber is a case gun, its ammunition being contained within a cartridge case. It fires 3 types of ammunition: ball, armor piercing and tracer. Tracer ammunition contains a chemical composition which gives off smoke or flame, for day or night use. The tracer makes it possible for the eye to follow the line of fire, thus aiding the gunner in determining his accuracy.

The firing is fully automatic. The gun will fire as long as the trigger is held back or until the magazine is empty. The gun is fed from a metallic link belt which is arranged in horizontal layers in a magazine. The magazine holds 250 to 350 rounds.

The barrel is surrounded by a water jacket which holds about 7 pints of water. The water absorbs the heat and prevents the barrel from becoming overheated. The aircraft type gun has an air rather than a water jacket and differs in some other respects.

THE BROWNING .50 CALIBER MACHINE GUN

This gun looks very much like, and employs the same principles of operation as the .30 caliber Browning. There are few differences between the two guns. The .50 caliber is used in antiaircraft defense and as part of aircraft armament.

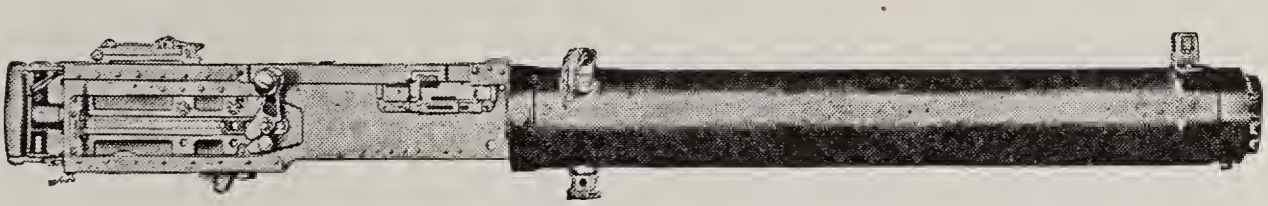


FIGURE 23-6.—The Browning .50 caliber machine gun.

The effective range of the two guns is about the same, over ½ mile. The rate of fire of the .50 caliber is 500-650 rounds per minute, which is 100-125 rounds per minute faster than the .30 caliber.

This machine gun is fed from a belt holding 100 rounds of ammunition. The water jacket holds about 8 quarts and is provided with a steam-escape tube. On the pedestal mount this gun may be elevated to 80° and swings in a complete arc.

TRACER CONTROL

Individual tracer control is the most satisfactory method of fire control for antiaircraft machine guns at ranges of 800 yards or less. At ranges greater than 800 yards the efficacy of tracer control drops off sharply due to the inability of the gunner to tell when his stream of bullets is passing through the target. At high angles of elevation, 55° to 80°, where super-elevation and the rate of change of target position angle are small, such as during a dive-bombing attack, individual tracer control should be satisfactory to the tracer burnout point, approximately 1800 to 2000 yards.

The correct method of observing tracers is to focus the eyes on the target and observe only those tracers which come into view near the target, rather than following the tracer stream from the muzzle of the gun.

Individual tracer control is the name most commonly used for that method of tracer control in which the gunner plays the tracer stream on the target in the same manner as he would hit a moving object with a stream of water from a hose. This method, with machine guns, is effective up to a maximum of approximately 800 yards, and is the most effective method at ranges less than 500 yards.

CHAPTER 24

Ammunition, Bombs, Mines and Torpedoes

AMMUNITION

Ammunition consists of projectiles used against the enemy, such as bullets, shells, bombs, torpedoes and mines, together with their fuses, primers and detonators. All signaling, illuminating, pyrotechnic and chemical warfare material is also included under this classification.

Separate-loading ammunition.—Ammunition in which the primer, propelling charge and projectile are loaded into the gun in more than one operation. All large caliber guns in the Navy use separate-loading ammunition.

Fixed ammunition.—Projectile and primer are firmly secured in a cartridge case containing the propelling charge, the gun being loaded in one operation.

Semi-fixed ammunition.—Primer and propelling charge are firmly fixed in the cartridge case but the projectile is separate or fits loosely in the cartridge case. Loading is done in more than one operation.

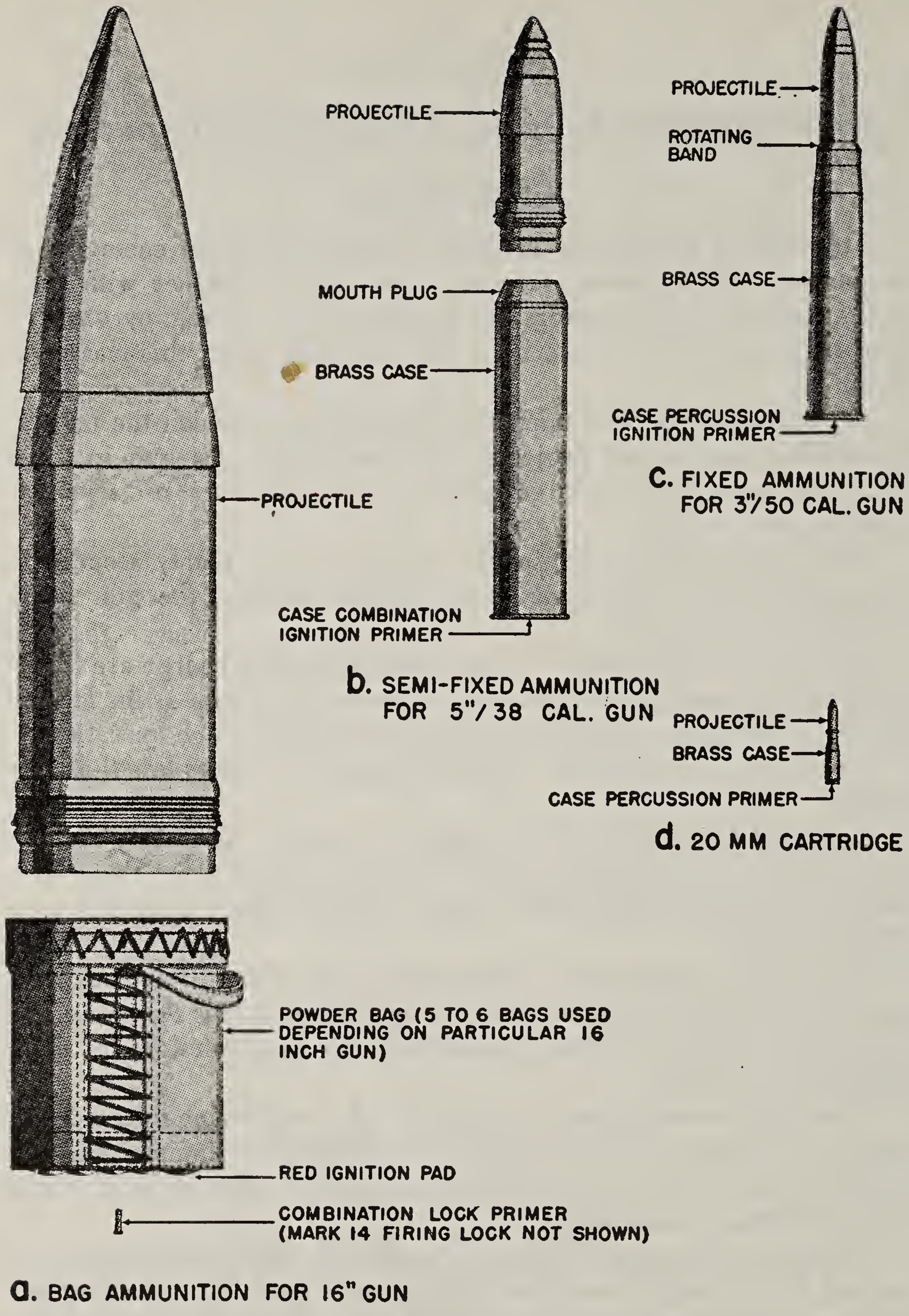
Small arms ammunition.—All cartridges of a caliber less than one inch.

Chemical ammunition.—All projectiles, bombs, grenades, candles, etc., containing gas, smoke and incendiary material other than pyrotechnic materials, and all gas, smoke and incendiary materials used from aircraft.

Pyrotechnic ammunition.—Fireworks adapted to military purposes and divided into four classes; signaling, illuminating, screening and incendiary. There are three general uses for pyrotechnics; for ship, ground or aircraft.

Bomb-type ammunition.—Aircraft bombs, submarine mines, depth charges, torpedoes, wrecking mines, etc. Bomb-type ammunition containing gas, smoke or pyrotechnic materials is classed as chemical or pyrotechnic ammunition.

Impulse ammunition.—Specially prepared propelling charges contained in cartridge cases fitted with primer. Used for launching torpedoes, depth charges or planes, and for firing mine-throwing projectiles.


PROJECTILE
MOUTH PLUG
BRASS CASE
CASE COMBINATION IGNITION PRIMER
PROJECTILE
ROTATING BAND
BRASS CASE
CASE PERCUSSION IGNITION PRIMER
PROJECTILE
PROJECTILE
BRASS CASE
CASE PERCUSSION PRIMER
POWDER BAG (5 TO 6 BAGS USED DEPENDING ON PARTICULAR 16 INCH GUN)
RED IGNITION PAD
COMBINATION LOCK PRIMER (MARK 14 FIRING LOCK NOT SHOWN)

a. BAG AMMUNITION FOR 16" GUN

b. SEMI-FIXED AMMUNITION FOR 5"/38 CAL. GUN

c. FIXED AMMUNITION FOR 3"/50 CAL. GUN

d. 20 MM CARTRIDGE

Figure 24-1.—Fixed, semi-fixed, and bag ammunition.

Blank ammunition.—Cartridge cases which have been loaded with primers and powder charges only or with powder and paper bullets. Used for creating noise, smoke puff, or both, and for signaling, saluting and training.

Dummy-drill ammunition.—Ammunition of any type assembled without explosive or with imitations of regular ammunition. Used for training and testing.

Powder.—Except for saluting guns, impulse ammunition, and a few other special purposes, smokeless powder is used as a propelling charge in our Navy. It is in the form of cylindrical grains of various sizes for different guns. Powder for large guns is carefully stacked in silk bags which are sewed and laced to keep proper size and shape. These are stowed in magazines in airtight metal tanks. A charge for any large gun is made up of one or more powder bags. A 5-inch gun uses one bag, a 16-inch gun uses four. At the base of the bag a black powder ignition charge is secured. It is ignited by the primer and in turn ignites the smokeless powder. This end of the bag is painted red and it is always placed toward the breech. Failure to put the red end toward the breech will cause hangfire and miss fire.

In fixed and semi-fixed ammunition the powder is contained in the cartridge case.

Among the other explosives used by our Navy is TNT, a high explosive. TNT is used for bursting charges such as the charge in the war head of a torpedo or in the projectile of a high explosive shell. It is also used in depth charges and mines which are exploded on contact or by pressure.

Projectiles.—*Armor-piercing projectile.*—The armor it will penetrate depends on the velocity of the projectile. It is cylindrical in shape with a solid pointed head. A soft steel cylindrical cap is fitted on the point of the armor-piercing projectile. When it strikes armor, the first shock bends the hard plate in while the projectile pierces its own cap. Its hard point then strikes the hard surface of armor. When the armor is bent nearly to its breaking point, the projectile enters easily.

Common projectile.—Thinner walls, thus allowing a larger space for the bursting charge.

Target practice projectile.—Same weight, size and shape as the common projectile, but made of much cheaper materials. It is filled with sand instead of a bursting charge to give proper weight.

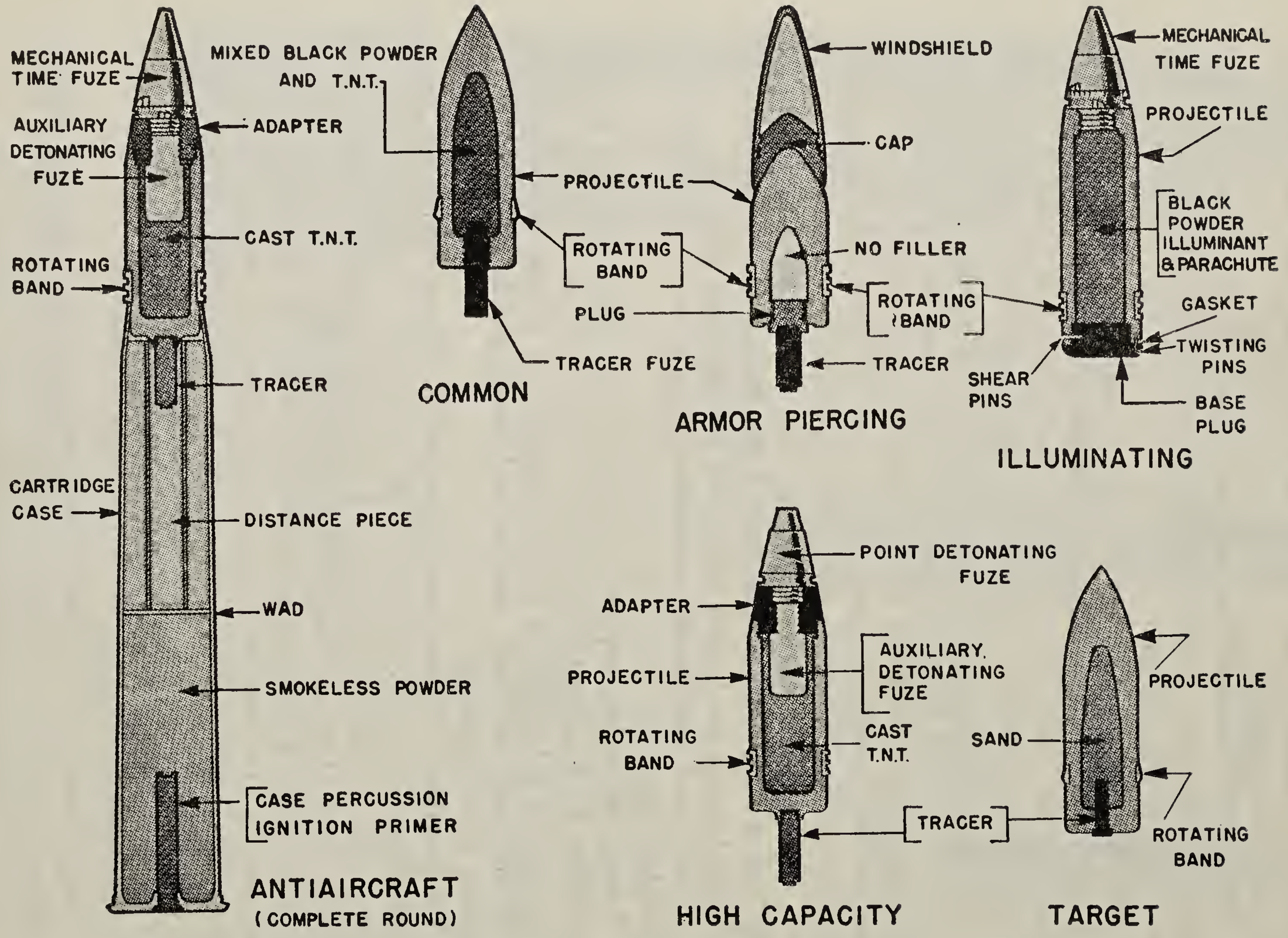


FIGURE 24-2.—Types of projectile.

Non-ricochet projectile.—Flat nosed with a large bursting charge; used against submarines.

Shrapnel projectile.—Cylindrical in shape with a round head. It is made of cast steel and has a small bursting charge and thin walls, its cavity being filled with a large number of small balls about ½ inch in diameter, packed in rosin or sulphur. Used against personnel or aircraft, shrapnel is set to burst in front of target.

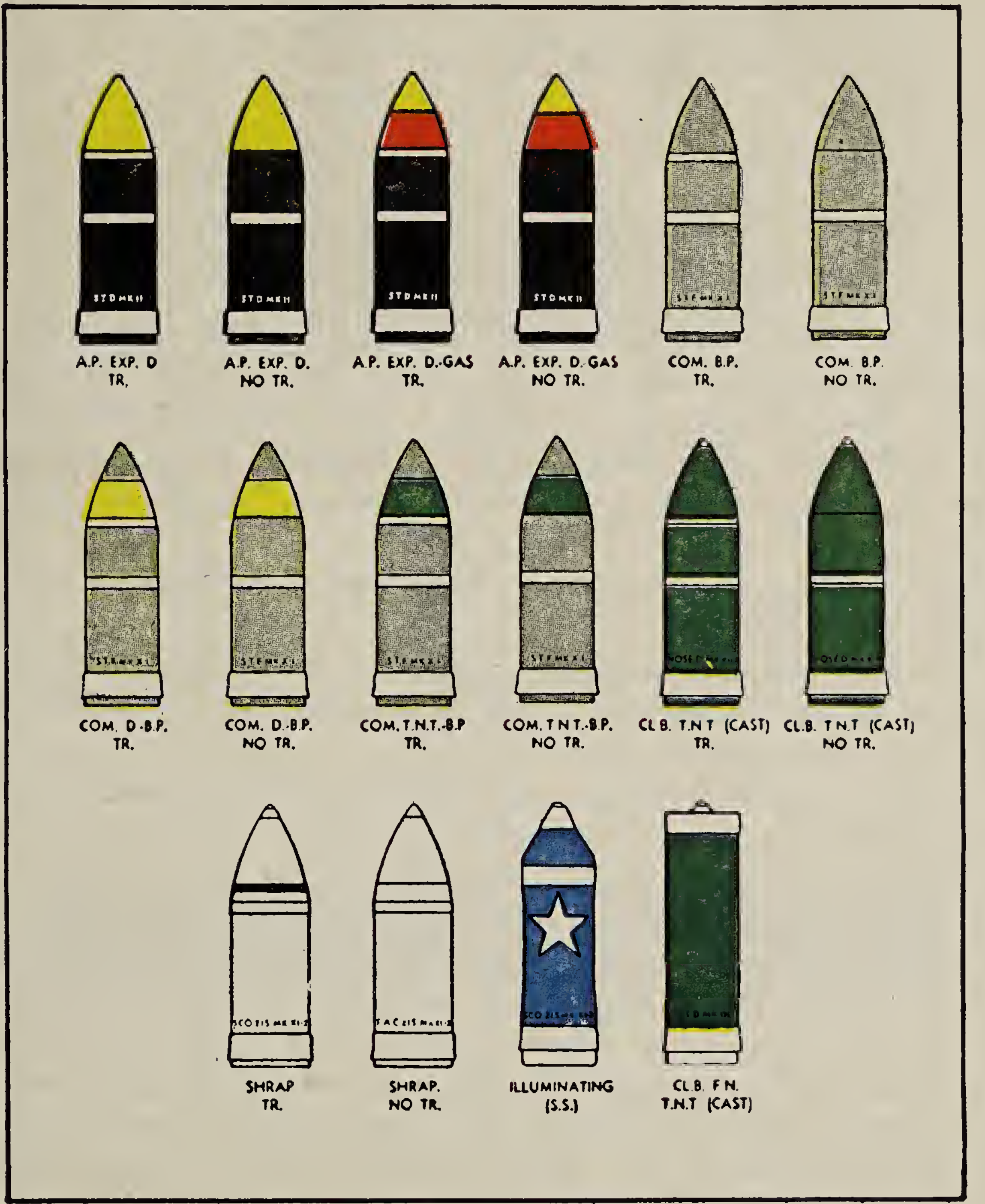


FIGURE 24-3.—Marking of projectiles.

Illuminating projectile.—Fitted with a time fuse which, when exploded, releases and ignites a large charge of slowly burning pyrotechnic material giving off a bright light. A parachute is used to suspend the illuminate.

Markings of projectiles.—

Armor piercing	black
Common and black powder	slate
Shrapnel	white
Target practice	unpainted
Explosive D	yellow
Class B and cast TNT	dark green
Illuminating	blue with white star

Rotating band.—A copper band is secured in an undercut score around the projectile near the base. When the gun is fired, the lands of the rifling cut into the soft metal band causing the projectile to turn in the bore. The rotating band prevents the escape of powder gases past the projectile and centers its rear end in the bore of the gun.

Parts of the projectile.—Nose; small end of the shell.

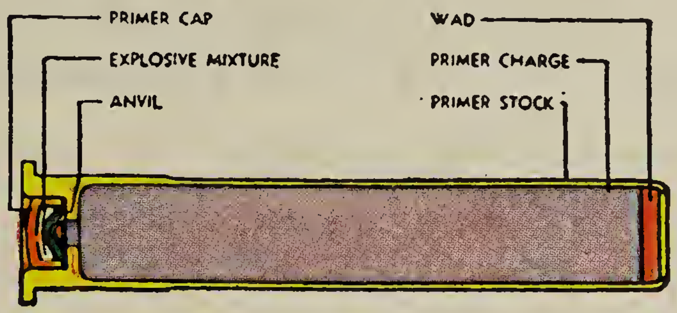
Base; large end.

Bourrelet; machine bearing surface near the forward end of the shell. It assists the rotating band in steadying the projectile as it moves out of the gun.

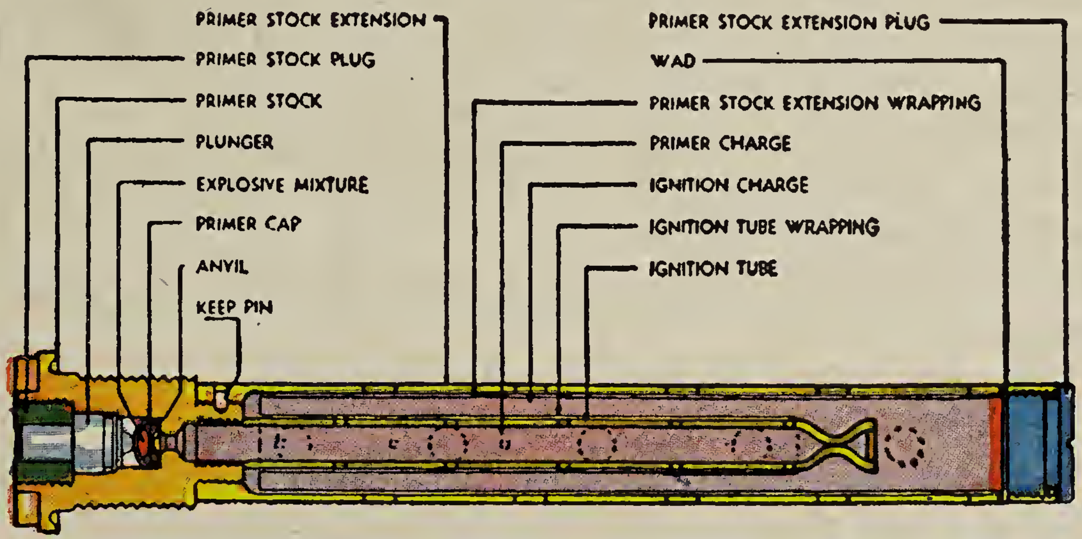
Tracers; a device fitted to the projectile to make it possible for the eye to follow it either in daylight or at night.

Primers.—Primers ignite the powder in the firing charge of a gun. Combination percussion and electrical primers are used for all heavy and intermediate guns. Percussion primers are used in 3-inch guns and under. The primer stock is made of bronze and is cylindrical in shape, the diameter of the base being about 6/10 of an inch and the length of the primer 2 inches. When a gun is fired by percussion, the firing pin strikes the base of the plunger which in turn strikes the fulminate of mercury cap, which fires the primer's charge igniting the firing charge. With an electric primer the current passes from the firing pin through the plunger, plunger cap, and a short platinum wire with a wisp of gun cotton around it called a bridge. The current heats the wire, ignites the gun cotton and powder, and thus fires the primer.

Fuses.—A fuse is used to explode the bursting charge in a projectile. The rotation of the projectile caused by the rifling of the gun makes a locking bolt fly out, arming the fuse. When the projectile strikes, the plunger flies forward and explodes the cap, which in turn ignites the black powder in the forward end of the fuse and finally



CASE PERCUSSION PRIMER. MARK X, MOD. 4.



CASE PERCUSSION IGNITION PRIMER. MARK XIV.

FIGURE 24-4.—Primer types.

the bursting charge of the shell. There are also time fuses which can be set to expose varying lengths of a train of powder, thus varying the time of explosion.

In antiaircraft fire the projectiles are fused in order to explode the projectile at a predetermined range. A fuse-setting mechanism is provided with each antiaircraft gun mount.

The use of time-fused projectiles makes possible two general methods of control:

1. The *Barrage Method* in which the projectiles are set to burst in an area which is in the path of the target's flight and through which the target will pass. This is the simplest method because it permits the fuses to be set in advance and eliminates continual changes of the fuse settings.

2. The *Direct Method* in which the fuse of each projectile is set so that it will burst as close as possible to the target. This method is most effective for a given rate of fire because each projectile is meant to hit and do damage.

Magazines.—*Location.*—Powder is stowed in specially constructed rooms fully protected by armor if the ship has any, and as far as possible from the boiler and engine rooms. Magazines are placed near the guns they supply. Turrets have their powder magazines and shell storage space directly below them. All magazines are fitted with permanent connections for flooding quickly in an emergency. They are lighted with special water-tight lighting fixtures.

Powder for only one caliber of gun is stowed in one magazine except small case ammunition. Fixed ammunition is kept in separate magazines stowed by calibers.

Safety precautions.—1. No naked lights shall ever be taken into a magazine.

2. During firing no ammunition other than that to be fired is permitted outside the magazine.

3. Magazine flap doors are opened, flaps being down except during the time of actual passage of the charge through the door.

4. There shall not be exposed (removed from tanks at one time in any one magazine) more than one charge for each gun supplied.

5. No matches shall be taken into the magazine.

6. Fire hose shall be led out and connected to the plug.

Safety precautions in handling ammunition.—Safety precautions are a part of Navy Regulations and are posted near magazines, guns, etc. Every one is important. The ones which are most applicable to all bluejackets are quoted as follows:

1. Safety devices provided to prevent accidents shall be kept in good order at all times.

2. No ammunition or explosive assembly shall be used in any gun or appliance for which it is not designated.

3. Ammunition handling shall be reduced to the minimum.

4. Powder containers shall be in perfect condition. Powder stored for a considerable period in a leaky container is likely to spoil rapidly with the danger of spontaneous combustion.

5. Care shall be taken not to obliterate identification marks on ammunition or to put it into incorrectly marked containers.

6. Projectiles shall not be altered, nor fuses nor other parts removed on board ship without instructions from the Bureau of Ordnance.

7. The fused projectile and cartridge case, whether in container or not, if dropped from a height exceeding 5 feet, shall be set aside and turned in at an ammunition depot as soon as possible. However, if shrapnel or an illuminating projectile with a 21 second fuse not set at safety is dropped, the complete cartridge, if it is fixed ammunition, shall be thrown overboard at once or put in water until this can be done.

8. Smokeless powder shall not be exposed to the direct rays of the sun. Powder in bulk, tanks, cartridge cases, ammunition boxes and other containers shall be protected against high temperatures.

9. Smokeless powder which has been wet must be regarded as dangerous for dry storage. It shall be kept completely immersed in fresh water and turned in at an ammunition depot at the first chance.

10. Before performing any work which may cause either an abnormally high temperature or an intense local heat in a magazine or other compartment used primarily as a magazine, all explosives shall be removed to safe storage until normal conditions have been restored.

11. Magazines shall be kept scrupulously clean and dry at all times. Particular attention shall be paid that no oily rags, waste or other materials susceptible to spontaneous combustion are stored in them.

12. Drill charges for bag guns soon become covered with oil and grease, and it is strictly forbidden to store such charges in magazines.

13. Nothing shall be stored in magazines except explosives, containers and authorized magazine equipment.

14. Intense heat will detonate TNT charges. TNT exudate is explosive and highly inflammable. Therefore the outsides of cast TNT containers shall be kept free from exudate, and it shall not be allowed to accumulate on decks nor to come in contact with wood, linoleum or other materials into which it will soak. TNT exudate shall be removed before it hardens, shall not be scraped off with

steel scrapers, and in scrubbng and wiping it up soap or alkaline solution shall not be used. Carbon tetrachloride is a safe and efficient solvent; but if cleared up in time, plain water and a stiff brush will generally remove the exudate from surfaces to which it adheres.

15. During gunnery exercises, charges in excess of the amount required to be available for one run shall not be assembled in the vicinity of guns mounted outside of turrets. No charge for a bag gun shall be removed from its tank, nor shall the tops of tanks be removed or so loosened that the bags may be exposed to flame until immediately before the charge is required for loading.

16. As soon as a gun is loaded, the breech shall be closed without delay.

17. The breech plug of a gun shall never be unlocked or opened while there is a live primer in the lock.

18. The salvo latch shall be removed or made inoperative during any exercise which requires opening the breech, except when firing a loaded gun.

19. When the fire of a bag gun is interrupted, otherwise than by misfire, and the gun remains loaded, a hangfire from an undetected ember from the last load may be in progress. Unless the previous loading interval was such that a careful and very deliberate examination of the bore previous to the last load precludes any possibility of this danger, the gun shall not be unloaded for 30 minutes, during which time the breech shall be kept locked and the gun pointed and trained in a safe direction.

20. If a powder bag is broken to the extent of allowing powder to fall out, the command *SILENCE* shall be given and the loose powder shall be gathered up. If it is impracticable to utilize this section of the charge satisfactorily in loading, it shall be secured in a flame-proof container or immersed in water.

21. Fitting fixed ammunition in guns by hand prior to firing may defeat its purpose by canting or loosening the projectile in its case. Such fitting shall not be done except by order of the commanding officer, and then not until the firing pins have been removed from the breech blocks and the firing circuits have been disconnected.

22. Except in action, whenever a circuit breaker becomes so sensitive as to function due to the shock of firing, the circuit breaker shall be either overhauled or replaced and shall not be tied or fixed in position so as to be inoperative for the purpose for which designed.

23. The covers of switches, circuit breakers, etc., shall be kept securely closed while powder is exposed in the vicinity.

24. Any cutting of torpedo air flasks, accumulators, piping or other receptacles for compressed air is prohibited.

25. Torpedo air flasks shall not be hoisted from submerged torpedo rooms, struck below, transferred, or shipped while in a charged condition.

26. In recovering a torpedo in the water the propeller lock shall be put on at the first opportunity and kept on until the torpedo is safely landed.

27. Leaky or punctured torpedo torch pots may supply the flame to ignite combustible gases. Therefore,

a. Torch pots of any sort shall not be stowed below decks.
b. Torch pots on vessels with submerged tubes shall not be taken below until just prior to firing.
c. Torch pots shall not be taken on board submarines except when it is contemplated to fire torpedoes. They shall habitually be stowed on the tender or at the base.
d. Torch pots shall, when practicable, be kept at least 20 feet from gasoline containers.

28. Smoke boxes which misfire or have been in water shall not be taken on board ship or inside buildings or structures on shore. Gas masks shall be worn when entering concentrated smoke clouds.

Mines.—Mines are used to protect the entrance of harbors and are often laid in enemy waters to sink or damage hostile shipping. There are many types of mines. Detailed information as to the types and construction of mines is restricted because of their nature. However, it may be said that there are three types of mines; contact mines, mines set off by sound, and mines set off by electrical impulse.

Contact mines.—This type of mine is set off by direct contact of the mine float against the hull of a ship.

Sound mines.—These mines are detonated by the effect of sound waves passing through the water nearby. Sound is caused by the revolutions of the ship's propeller.

Magnetic mines.—These mines are exploded by the action of magnetic impulses sent out from the ship passing over.

Degaussing equipment prevents the passage of these magnetic impulses and renders such mines useless.

Bombs.—There are four main kinds of bombs in use. They are the demolition bomb, the anti-personnel bomb, incendiary bomb and gas bomb.

Demolition bomb.—This type of bomb is the heaviest type in use. Its purpose is to destroy equipment as well as personnel and to devastate as much as possible. The block buster is a good example of this type of bomb.

Anti-personnel bomb.—This type of bomb is used to destroy personnel and act somewhat in the same way as shrapnel.

Incendiary bomb.—These bombs are usually small and made of thermite or some such material with a high burning temperature so that they can start fires of all kinds. Incendiary bombs are dropped in great numbers over wide areas.

Gas bombs.—This type of bomb along with the gas shell is the means of using various types of chemicals to immobilize enemy personnel. For a description of the types of gas used, refer to Chapter 31.

All of the above bombs may be so constructed as to be delayed action bombs. The advantage of this is obvious. Personnel or troops attacked with delayed action bombs are caught off-guard after the attack is over and the possibility of doing maximum damage is greatly increased.

Torpedoes.—*Design.*—Torpedoes are cigar-shaped projectiles fired from ships and contain a large charge of TNT. They are propelled by their own engines, the force of discharge being insufficient to speed the torpedo to its mark. The intricate mechanism of the torpedo permits it to travel great distances and to turn on its course. It explodes upon contact and does so with such terrific force that it can cause great damage to even the most heavily armored ship. Torpedoes are fired from destroyers, submarines and planes, primarily. Torpedo tubes aboard ship are so arranged that a pattern or spread of them may be fired so as to give the effect of shotgun fire. In this way a large area of water is covered and escape is difficult. The design, speed, range and maneuverability of torpedoes are restricted information. It is known that they have been developed to a high degree of efficiency and are an extremely potent weapon for use against enemy shipping of all kinds.

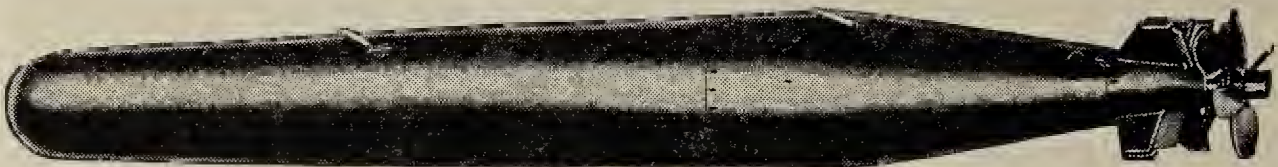
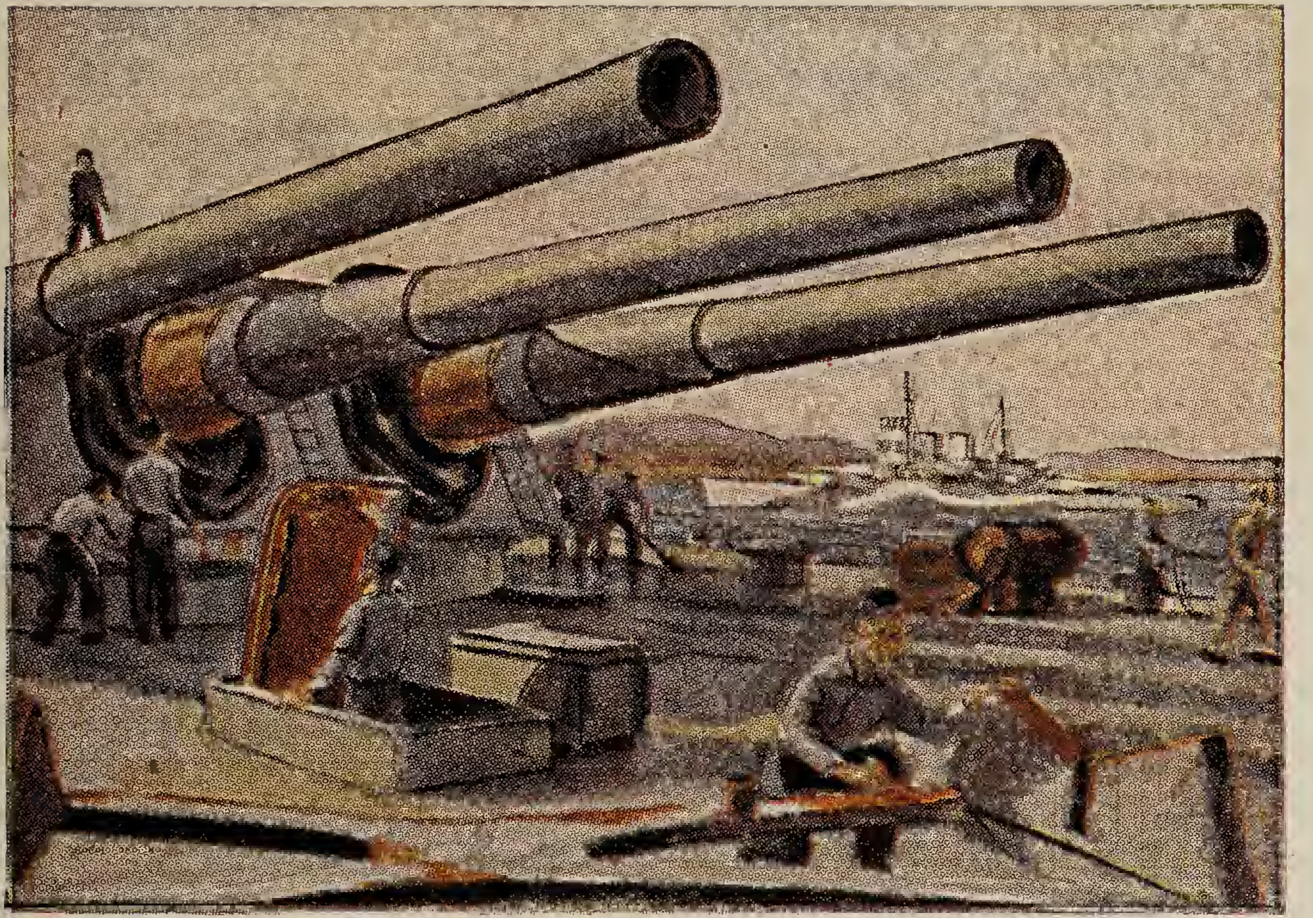


FIGURE 24-5.—The torpedo.

Depth charges.—Depth charges are cylindrical cans about 36 inches long and 18 inches in diameter. They are filled with TNT and fitted with an explosion mechanism which is operated by a depth gear. They may be set to explode at various depths.



PART 5

SHIP ORGANIZATION AND DUTIES AFLOAT

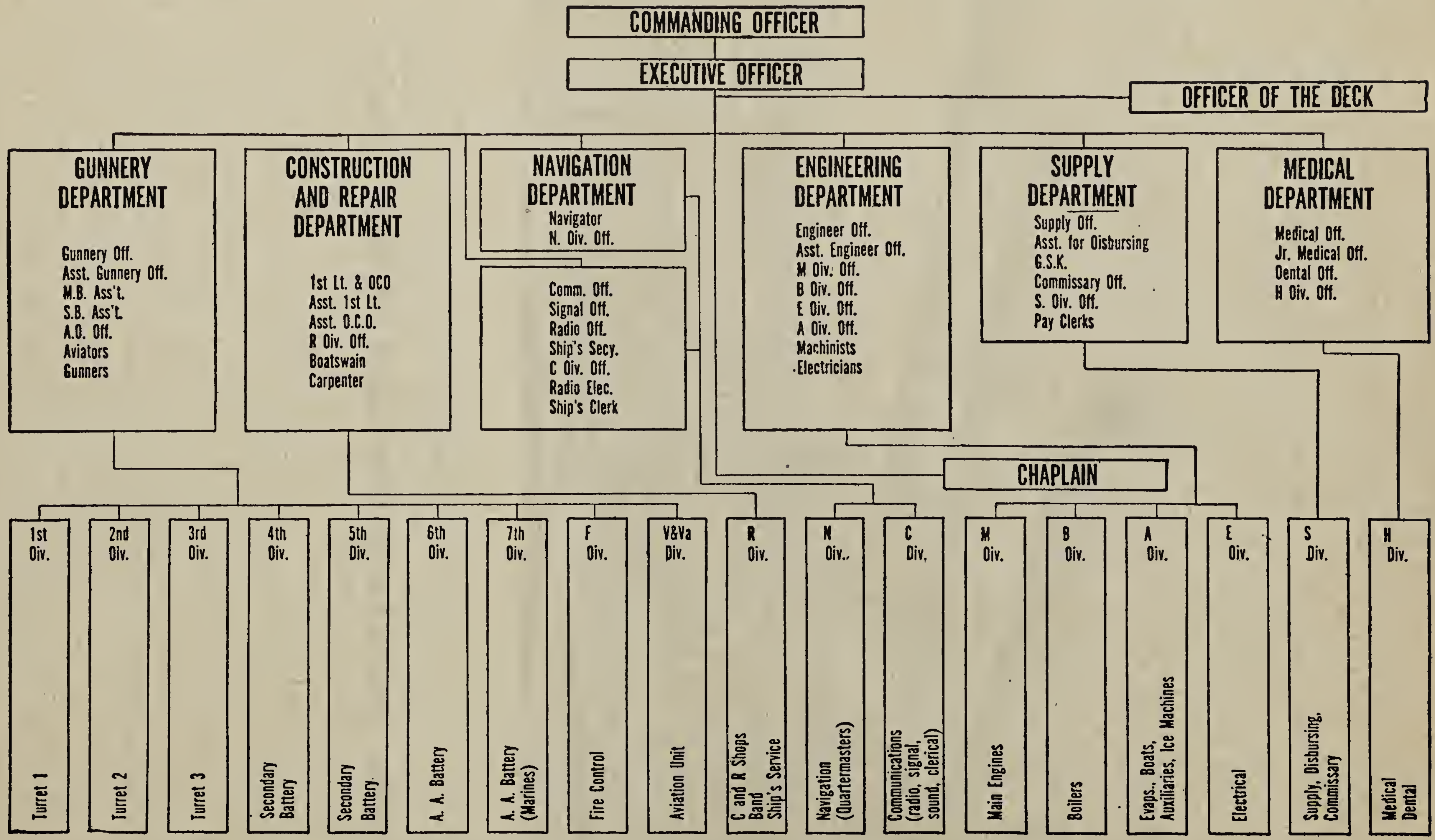


FIGURE 25-1.—Typical battleship organization

CHAPTER 25

Ship Organization and Daily Routine Afloat

The table on page 260 indicates a typical organization of a Navy battleship. The Commanding Officer is responsible for the operation and fighting efficiency of his ship, every member of the crew and every act of the crew. The Executive Officer might be called the general manager of the ship. He takes care of the general operation of the ship, referring all matters of importance to the Commanding Officer for his decision. All routine business clears through the Executive Officer. On the diagram a line to the right leads to the Officer of the Deck. This means that while he is on watch he assumes the duties of the Commanding Officer and is responsible to him for the proper operation of the ship. However, when any decisions are to be made or when there is a change in weather conditions, course or other plans, he refers to the Captain. The Officer of the Deck stands his watch on the bridge when the ship is under way and on the quarter-deck when the ship is in port. To the ship's company, he represents the authority of Captain. The various sections of the ship are broken down into departments.

ORGANIZATION

Gunnery Department.—The head of the Gunnery Department is the Gunnery Officer who is responsible for the maintenance and efficient operation of the ship's ordnance equipment. This department is broken down into several divisions. The primary divisions are those of the big guns, which on the diagram are divisions 1, 2 and 3. Secondary batteries are assigned to divisions 4 and 5. The antiaircraft batteries on a modern battleship are of tremendous importance. Since the sinking of the *Prince of Wales* and the *Repulse,* antiaircraft batteries have been built up to such an extent that in some cases they amount to half of the total Gunnery Department.

Construction and Repair Department.—This department is headed by the First Lieutenant and Damage Control Officer. His duties as First Lieutenant make him responsible for general maintenance of the ship and its equipment. As Damage Control Officer, he is responsible for maintaining watertight integrity of the ship under all conditions. The R Division, consisting of construction and repair shops, band and ship's service, comes under the direction of the First Lieutenant and Damage Control Officer.

Navigation Department.—The Navigation Department is headed by the Navigator of the ship and consists of the N Division. The Navigator is responsible for the safe navigation of the ship. He furnishes all information about the ship's location, approximate times of arrival at ports, passage through dangerous waters, etc. The Navigation Division Officers and Quartermasters make up the N Division.

Communications.—The Communications Officer is responsible for transmission and reception of all messages, no matter by what means, and for proper operation of various defense gear aboard ship. The Signal Officer is responsible for proper reception and transmission of messages by means of visual communication. The Radio Officer is in charge of reception and transmission of messages by radio. The ship's Secretary maintains a complete file of all messages received and sent, prepares messages for transmission upon approval of the Commanding Officer and maintains the ship's records. The C Division, consisting of all communications, radio, signal, sound and clerical personnel is under the direction of the Communications Officer.

Engineering Department.—This department is headed by the Engineering Officer who is in charge of all engineering equipment and operation of it aboard ship. The M, B, E and A Divisions fall under the direction of the Engineering Officer. M Division is responsible for the main engines of the ship. B Division maintains operation and repairs the boilers. E Division is responsible for the operation, maintenance and repair of electrical equipment aboard ship. The A Division takes care of all auxiliary engines such as pumps, air conditioning equipment, water purifying systems and motor boats.

Supply Department.—The Supply Department is headed by the Supply Officer who has the responsibility of issuing all supplies and of keeping records of them. The Disbursing Officer is in charge of the pay of the ship's company and of accounts. The supply, disbursing and commissary personnel make up the S Division which comes under the authority of the Supply Department.

Medical Department.—This department is headed by the Senior Medical Officer aboard the ship who is responsible for the proper operation of the H Division. The Dental Officer is responsible to the Medical Officer for operation of his section of the H Division. The H Division has the responsibility of keeping the maximum number of men at battle stations for the longest period of time, and safeguards the health of all the ship's company.

Chaplain.—The Chaplain is responsible to the Executive Officer for the spiritual, educational and moral welfare of the ship's company. The ship's library is maintained by him. If there is a ship's newspaper, it is produced under his direction. Entertainment is also the responsibility of the Chaplain.

On ships where planes are carried and there is a large enough number of personnel, a separate department called the Air Department is established. On all other ships, aviation personnel is attached to the Gunnery Department because planes carried aboard this type of ship are usually for scouting or spotting purposes only.

In addition to the above divisions on a ship, an X Division is often maintained. Drafts of new bluejackets are assigned to this division for training, and after they have completed their indoctrination in life aboard ship, they are assigned to various other divisions, depending upon the need for personnel in these divisions and the experience and abilities of the individual sailor. When you go aboard ship, you may be assigned to this division for training in the performance of your duties.

The organization partially described above maintains and operates a battleship. On smaller ships the number of personnel varies depending upon the size of the ship, but the same general organization is set up aboard all the Navy's vessels. The divisions of the ship provide a basis for the organization and assignment of watches.

Daily routine aboard ship.—The routine established for operation of a ship varies with the size and kind of ship, whether it is at sea or in port, and whether or not it is under combat conditions. The routines given below are in general use in the Navy.

Routine in port.—

0400. Call ship's cooks of the watch.
0445. Call police petty officer, boatswain's mates, buglers and hammock stowers.
0500. Reveille; call all hands, pipe "up hammocks," serve out coffee; light the smoking lamp.
0515. Haul over hammock cloths and stop them down; police petty officers report decks clear of hammocks.

0520. Pipe sweepers; sweep down thoroughly before decks are wet.
0525. Off shoes and socks, or put on boots, according to weather conditions; get out wash-deck gear.
0530. Turn to; smoking lamp out; execute morning orders; clear lower decks. Five minutes before sunrise station men for turning off anchor, boom and gangway lights; scrub clothes.
0600. Knock off scrubbing clothes; trice up lines.
0645. Take off gun covers and hatch hoods.
0700. Up all hammocks.
0715. Mess gear; light smoking lamp; publish uniform of the day.
0730. Breakfast.
0800. Colors.
0815. Turn to; out smoking lamp.
0830. Sick call.
0845. Sweep down; stow away all wash-deck gear; clear up the deck for quarters.
0910. Officers' call; divisions fall in for muster.
0915. Quarters for muster and inspection; physical drill, followed by the drill prescribed.
1130. Retreat from drill; pipe down scrubbed clothes, if dry; sweep down; light smoking lamp; mast for reports and requests.
1145. Mess gear.
1200. Dinner.
1230. Band call; band concert till 1300.
1300. Turn to; smoking lamp out; pipe sweepers; pipe down aired bedding, if up; pipe down washed clothes, if dry.
1330. Drill call.
1430. Retreat from drill; turn to.
1600. Knock off work; pipe down clothes, if up; sweep down; light smoking lamp.
1630. Lay aft the liberty party.
1730. Clear up decks.
1745. Mess gear.
1800. Supper. Five minutes before sunset call guard of the day and band; station detail for all lights; turn on lights at sunset.

1830. Turn to; pipe sweepers; wet down decks for scrubbing clothes.
1930. Hammocks; no smoking below the main decks.
2000. Muster the anchor watch; searchlight and signal drills if ordered.
2030. Trice up the clotheslines.
2055. First call; out smoking lamp.
2100. Tattoo; pipe down; silence; muster and set first anchor watch.
2105. Taps.

Routine at Sea.—

0200. Relieve wheel and lookouts.
0350. Call the watch section.
0400. Relieve the watch; muster the watch section and lifeboat's crew; light smoking lamp; call ship's cook of the watch. Five minutes before sunrise station details at running lights; turn off at sunrise; relieve lookouts and station masthead lookouts.
0500. Call idlers and section of the watch sleeping in; coffee.
0520. Pipe sweepers.
0530. Turn to; smoking lamp out; execute morning orders.
0600. Relieve the wheel and lookout; trice up clotheslines.
0645. Hammock stowers haul back hammock cloths.
0700. Up all hammocks.
0715. Hammock stowers stop down hammock cloths; mess gear; light smoking lamp.
0730. Breakfast; shift into the uniform of the day during the meal hour.
0800. Relieve the watch (both sections on deck); muster watch and lifeboat's crew.
0815. Turn to; smoking lamp out.
0830. Sick call.
0845. Sweep down; stow away wash-deck gear; take down towel line; clear up decks for quarters.
0910. Officers' call; divisions fall in for quarters.
0915. Quarters for muster and inspection; physical drill, and drills as prescribed.
1000. Relieve the wheel and lookout watch.

1030. Retreat from drill; pipe down washed clothes, if dry; sweep down.
1145. Mess gear.
1200. Dinner.
1230. Relieve the watch; band call.
1300. Turn to; pipe sweepers; smoking lamp out.
1315. Drill call, if ordered.
1400. Relieve the wheel and lookout.
1415. Retreat from drill; pipe sweepers; turn to.
1530. Pipe down washed clothes, if up.
1600. Relieve the watch; muster watch and lifeboat's crew.
1630. Sweep down, knock off ship's work; light smoking lamp. Five minutes before sunset station detail at running lights; turn on running lights with senior ship present; station bridge lookouts; inspect lifeboats.
1730. Clear up decks.
1745. Mess gear.
1800. Supper; relieve the wheel and lookout.
1830. Turn to; sweep down; wet down decks for scrubbing clothes.
1900. Band call; band concert for crew until 2000.
1930. Hammocks; no smoking below decks.
2000. Call the watch; relieve the wheel and lookout; relieve the watch; muster watch and lifeboat's crew; turn out all but standing lights and lights in officer's quarters and chief petty officers' mess room.
2100. Smoking lamp out; turn out lights in chief petty officers' mess room.
2200. Relieve the wheel and lookout; turn out lights in officers' quarters unless an extension has been granted.
2350. Call the watch.
2400. Relieve the watch; muster the watch and lifeboat crew.

Notes on routine.—

Turn to.—Turn to is the signal for work to begin. On special occasions, such as provisioning ship or painting ship, the time of Turn to may vary greatly; the time is always specified in the morning orders of the Executive Officer. Smoking ceases; the smoking lamp is put out; work begins, sweepers are piped; gear is laid up off the deck to keep dry if decks are to be scrubbed; and preparations for cleaning ship are made.

Liberty.—Liberty is usually granted by watches, each watch alternating liberty on week days and alternating 48 hour liberties on week ends. Special liberty is granted men by the Executive Officer at his daily mast for requests at 1130. Men must see their Division Officers before going to the Executive for special liberty. Liberty parties are called aft at the proper time by the Officer of the Deck, and he inspects them carefully for cleanliness and uniform before allowing them to leave the ship. Men wearing soiled uniforms or incomplete uniform, or having shoes not shined, or having hair not cut properly, or not cleanly shaved will not be permitted to go on liberty. The method of making out liberty lists varies on different classes of ships, and you must learn the system in use on your ship.

Hammocks.—At the call of "Hammocks" all hands go immediately to the nettings where their hammocks are stowed. The hammock stowers undo the stops of the hammock cloths. The police petty officers inspect to see that all hands are standing by the nettings and then report to the Officer of the Deck. The Officer of the Deck orders the boatswain's mate of the watch to pass the order, "Trice up the hammock cloths." The hammock stowers carry out the order. The Officer of the Deck then orders, "Pipe down hammocks." The boatswain's mate sounds the "pipe down" call and all hands get their hammocks.

Sick call.—Sick call is sounded at 0830. If sick, men report to the sick bay at this time. In case of accident or serious illness men can report to the sick bay at any time. The doctor is the only one on board who can excuse men from duty on account of illness. Concealing a disease is a serious offense, as men thereby expose their shipmates to it. Feigning sickness in order to escape duty is also a serious offense. Not only is it unmilitary, but also it involves lying and may be punished by court-martial.

Quarters and drill.—Morning quarters usually is held at 0915. The signal for quarters is the "assembly" sounded on the bugle. "Officers' call" is sounded 5 minutes before the "assembly." Men of the various divisions fall in for muster in the respective parts of the ship assigned them. The Division Officer inspects the men, especially as regards neatness and cleanliness. Clean clothes must always be worn to quarters. Men must be carefully shaved and neat in every respect.

The division is mustered by the petty officers in charge of sections. The Division Officer then reports to the head of his department. Meanwhile the division may be allowed to "rest," but if the Division Officer or a petty officer has not given this order absolute silence in ranks must be maintained, and if the order "at ease" has not been given, men must stand at the position of "attention" and maintain absolute silence. Carelessness or unmilitary bearing of men at quarters is a sign of a careless, unmilitary and, often, an inefficient division on board ship.

After quarters the men are dismissed in order to get into uniform for the drill which is to follow. Each man should have a uniform handy, either in his bag or locker, so that he can shift into the proper uniform for drill in a few minutes. When drill call is sounded, men go to their stations for drill on the double and maintain silence. A slow and noisy division cannot be other than an inefficient division. Drills are held to train all hands and make the crew an efficient fighting unit. All drills have this one mission in view. If all hands fail to act at drill as they should in a time of great emergency, they will be found wanting when this emergency arrives.

Members of the Engineer Department, except the auxiliary watch, usually muster at their station in working clothes at 0815 on workdays and proceed immediately with their work. They attend the all hands drills, such as general quarters, fire, collision and abandon-ship drills, and proceed immediately with their overhaul and cleaning work after "secure." The members of the auxiliary watch not on duty fall in at quarters in the uniform of the day.

Musters and inspections.—For general musters, divisions fall in at quarters and are marched by their division officers to the quarter-deck. The officers then turn their divisions over to the senior petty officers of the divisions and form line on the starboard side of the quarter-deck. The reading of all general orders and communications affecting the men, such as sentences of court martial, or the presentation of medals, takes place with the crew in formation. Once every month the Articles for the Government of the Navy are read.

Inspection by division officers is held at all quarters for cleanliness of uniform and person. On Saturday the uniform is usually dress, and men should wear the best they have and be scrupulously clean and neat in appearance. After the Division Officer inspects and reports to his head of department, ranks are opened and the front rank is faced about and dressed. When the Captain approaches in the course of his inspection, the order, *HAND SALUTE*, is given. Every man salutes with his right hand, keeps the hand at salute until the order, *TWO*, and then drops the hand smartly to the side. The Captain then inspects the division.

The division and division petty officers inspect all parts of their ship except double bottoms every day for cleanliness. The First Lieutenant also inspects all parts of the ship daily for cleanliness, neatness and upkeep. The Captain and Executive inspect all lower decks once a week, usually on Friday, and the upper decks every Saturday. When every man does his share to prevent dirt and all men clean their stations, it is an easy matter to pass all these inspections. However, this ideal condition is seldom attained and this work which should never be hard is often an endless and seemingly a hopeless task. Every man has some cleaning station and every man helps to make his station dirty. If everyone helps him to keep it clean, the ship will soon be spotless, and, what is more, but little work will be necessary to keep it so.

Admiral's inspections are held every quarter. Two of these inspections are for cleanliness and upkeep only. One is the semi-annual inspection in which the battle-efficiency inspection is added to the regular quarterly inspection. The other is the annual inspection which includes all drills as well as everything given in the semi-annual inspection. It should be the ambition of all hands to pass a good Admiral's inspection. These inspections will show how one ship compares with another; how each man compares with other men on board ship. When the Admiral can call a ship a smart ship, each man knows that everyone aboard is a smart sailor and can be depended upon anywhere and at any time. A smart ship is always a happy ship. It shows that everyone on board is considerate of everyone else, that everyone tries to help and cooperate, knows his job and is doing it.

Messes.—The Supply Officer of the ship has charge of the general mess. He is assisted by such commissary stewards, cooks, bakers, butchers and jacks-of-the-dust as are necessary for the purchase, stowing, issuing and preparation of food for all hands. The ship's crew is divided into messes of about 20 men, each mess being made up of men from the same division as far as practicable, and placed in that division's part of the ship. A petty officer is in charge of each mess, and all complaints by members of the mess must be made to this petty officer in charge.

The petty officer is responsible for proper order, and must see that food is not wasted and that sufficient food is provided. A mess cook is detailed to each mess. He is responsible for the cleanliness of the mess table and gear, serves the food, and assists in drawing provisions and preparing the food for cooking. Men in the steward's branch are excused from all work in their division's part of the ship and from all watches, but they must attend all quarters and drills unless properly excused by the Executive Officer. Special police petty officers are placed in charge of all men in the steward's branch and they are responsible that the men in that branch carry out their duties, keep their station and mess clean and keep their persons clean. The police petty officers inspect the men in the steward's branch every day and inspect the mess tables and mess gear before every meal.

Smoking hours.—The Commanding Officer designates the parts of the ship where smoking is allowed, and, if possible, places are provided where all may be comfortable.

The crew may be permitted to smoke at times other than those specified in the normal routine, especially on holidays or Saturday and Sunday afternoons, and for a limited period during night watches.

Smoking in any part of the ship during Divine Services is forbidden.

Smoking in the ship's boats not on detached service is forbidden.

The police petty officers have charge of the smoking lamp and see that it is kept lighted only during the approved hours. They take care that there is no smoking in any unauthorized places or at unauthorized times.

There shall be no smoking when ammunition is being received or discharged, or when fuel is being taken aboard.

SPECIAL INFORMATION ON PROCEDURES ABOARD SHIP

Disposal of refuse.—Wood, barrels, packing boxes or unpierced metal cans must not be thrown overboard, either in port or at sea. All such boxes and barrels must be broken up and sent to the fireroom or incinerator; all metal cans must be pierced before being thrown overboard. In confined ports where garbage would constitute a menace to the health or a nuisance to the people in the vicinity, it shall not be thrown overboard but shall be burned on board ship or otherwise disposed of in some suitable manner prescribed by proper authority .

Air and gun ports.—When at sea, no ports shall be opened without the knowledge and consent of the Captain, and they shall always be opened and closed by men especially appointed for that duty. Ports of the lower decks shall be closed at sunset unless special authority is granted to keep them open, and a report shall always be made to the Officer of the Deck when a port is opened or closed. Neither gun nor air ports shall be opened when there is any probability that water will enter to a dangerous extent. Nothing is to be hung up or placed in or thrown out of the gun ports.

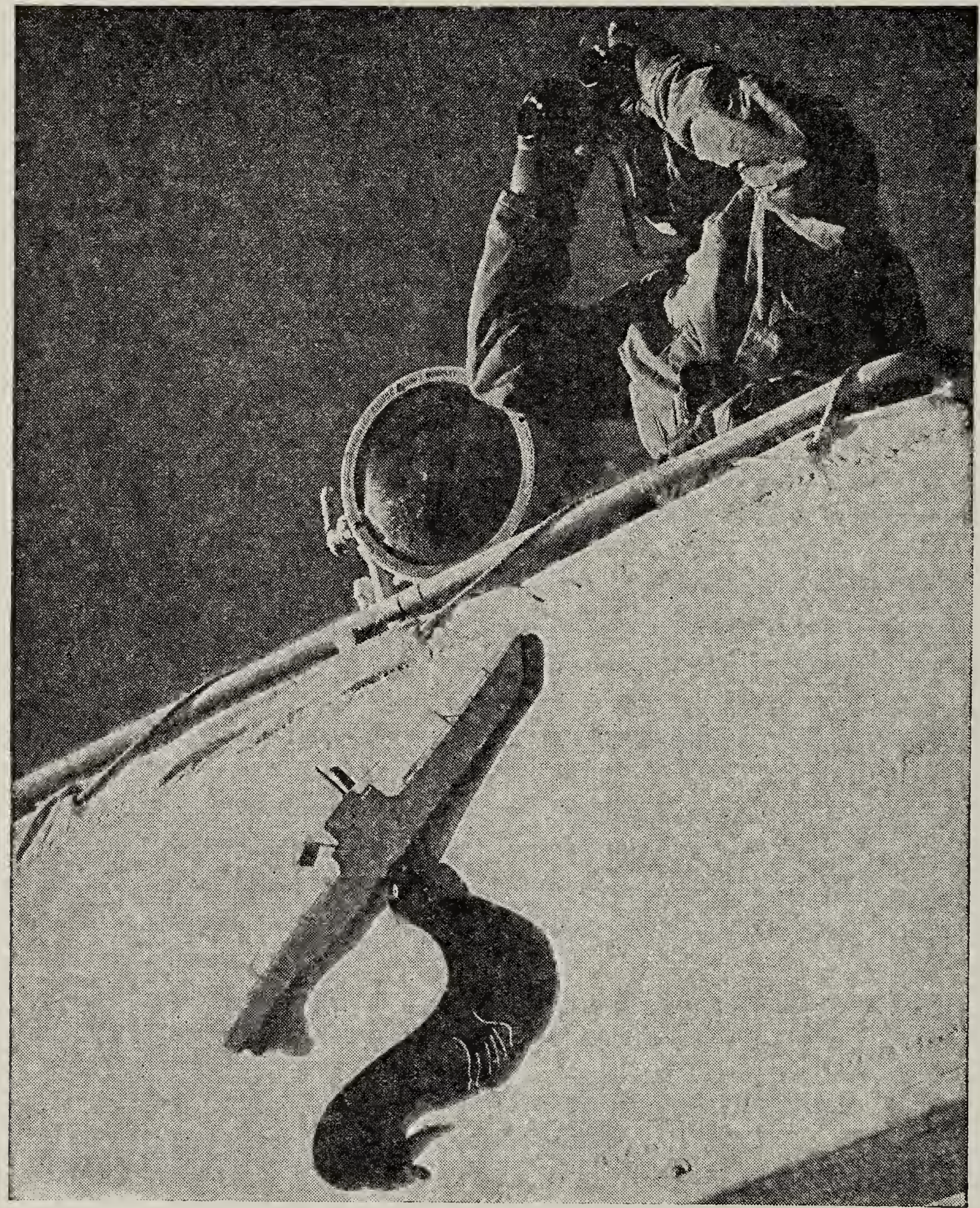


Figure 26-1.—Lookout on the flying bridge of a trawler.

CHAPTER 26

Watches and Lookouts

WATCHES

The term, *watch,* is used in several ways. Usually it is thought of as any one of the periods into which the day is divided.

0000-0400—Mid Watch
0400-0800—Morning Watch
0800-1200—Forenoon Watch
1200-1600—Afternoon Watch
1600-1800—First Dog Watch
1800-2000—Second Dog Watch
2000-2400—Evening Watch

The 1600 to 2000 watch is dogged to allow the men to be relieved to eat their evening meal and to divide the recreation period.

The word *watch* sometimes refers to a place, or the location of the man on watch, as *the starboard watch,* or *the port watch.* It may refer to the section of a ship's crew on duty or even to the man on watch such as *lookout watch* or *speed cone watch.* If you know these different uses of the word you will find it easier to understand discussions of watch duties.

Watch section.—One half of each division is assigned to the starboard watch, and the other half to the port watch. On the larger ships each of these watches is divided into 2 sections. Thus each division is made up of four sections numbered 1 to 4.

Division			
Starboard Watch		Port Watch	
Section 1	Section 3	Section 2	Section 4

The odd-numbered sections are in the starboard watch and the even-numbered in the port watch. Smaller ships may have only 3 sections.

Watch, Quarter and Station Bill.—Upon being assigned to a division, one of the first things you must know is the location of your stations for the various drills aboard ship. This information will be found in the Watch, Quarter and Station Bill. One is usually posted on the bulletin board in each division's part of the ship. On this bill you will find your name and rate. Beside your name you will find your billet number and your station for each of the following drills and activities and possibly for some not shown here.

General Quarters
Fire
Collision
Abandon Ship
Fire and Rescue
Plane Crash and Salvage
Gun Station
Mess
Berth

A billet number has four digits. The first represents the division, the second the section, the third and fourth the billet number. If your number is 1215, you are in the first division, second section, and your billet number is 15.

Some ships use a station billet slip of the following type:

U.S.S. ....

STATION BILLET

Name ....

Watch No. .... Rate ....

Division .... Section .... Part ....

Locker No. .... Mess No. ....

Stows Hammock .... Stows Bag ....

Gun .... Boat .... Station ....

Clear Ship for Action ....

Battalion .... Company ....

Fire Station ....

Collision ....

Abandon Ship Boat .... Provide ....

Division Officer ....

This slip is given a man when he is directed to report to the Division Officer or Division Petty Officer of the division to which he is assigned. When filled out, it is returned to the Executive Officer.

Officer of the deck.—During all watches the Officer of the Deck is in charge. He has full responsibility for the safety of the ship, subject, of course, to the orders he may receive from the Commanding Officer. Every member of the ship is subordinate to the Officer of the Deck except the Commanding Officer and the Executive Officer.

Condition watches.—Aboard ship there are 3 conditions of readiness for battle or for simulated war operations. The one in operation depends on the anticipated danger. Each is defined as follows:

Condition three.—The probabilities of an attack are rather remote and the crew is standing four hours on and twelve hours off, except for the dog watches.

Condition two.—A surprise attack may take place at any time by aircraft, surface ships or submarines. The watch is four hours on and four hours off.

Condition one.—An attack is imminent. Every officer and man from the Captain on down is at his general quarters station ready to do his best.

Watch duties of the deck divisions.—Sea watches required for normal cruising, particularly in conditions of readiness one and two, are normally handled by the Navigation Department. Under special conditions, certain gunnery divisions may be called upon for assistance. All watches are four hours in length. The time off depends on the condition of readiness under which the ship is operating.

Special sea detail.—In getting underway or entering a port, a ship has what is known as a special sea detail. This is composed of experienced men for the different stations that have to be manned. Some of these stations are as follows:

helmsman
lee helmsman
engine order telegraph
telephone talker
lookouts
quartermasters
signalmen
degaussing board
speed flags
leadsmen
lifebuoy
messengers
orderlies
selected guns
fire control
depth charges and releases

speed cones
fog whistle signal (at sea)
fog bell signal (in port)
steering engine
fog buoy or towing spar
line handling parties, if moored to a dock
anchor detail, if your ship is anchored or going to anchor

There are many other watches, of course, but this listing gives an idea of the necessary watches when a ship enters or leaves a port. In addition, when the ship is going in and out of port, the Captain, assisted by the Navigator and the Officer of the Deck, is on the bridge and conns the ship.

The special sea detail is at stations one half hour before getting underway and remains there until the ship clears the harbor. Once the ship has cleared the entrance buoy, the regular sea detail relieves the special sea detail.

Regular sea detail.—If your section has the first watch at sea, your section leader will muster his section and assign each man to his particular watch or duty. As a seaman first or second class, you might be assigned to one of the following watches: helmsman, lee helmsman, engine order telegraph (or annunciator), messenger, sentry, orderly, lookout or life buoy watch. Certain men of each division are detailed as mess cooks for a 3 month period. Although they may not stand watch during the day, they usually stand at night with their section. To suggest the general nature of watch duties, a few will be described.

Helmsman.—An experienced helmsman is usually a seaman, first class, and stands a two hour watch at the wheel, steering or keeping the ship on its course. A lee helmsman is usually a seaman, second class, and he is on watch with the regular helmsman for instruction. A lee helmsman may steer the ship with the permission of the Officer of the Deck and under the supervision of the regular helmsman, when the ship is well clear of land.

Engine-order telegraph.—If you are stationed at the engine-order telegraph, your duty is to move the lever to indicate the speed designated by the Officer of the Deck and to see that the answering pointer on the instrument moves to indicate the same speed; this shows that the engine-room has received and understood the signal. If the signal is not answered instantly from the engine-room, move the lever again, bearing in mind the fact that you must use a little muscle in order

FIGURE 26-2.—Helmsman at the wheel.

to operate the lever properly. If the engine-room still fails to answer, report immediately to the Officer of the Deck.

If you are detailed for a watch at the engine-order telegraph, don't be afraid to ask questions; be sure that you understand your duties, for the safety of the ship may depend upon the promptness and accuracy with which you execute orders. Never lean against the telegraphs and never touch them without orders from the Officer of the Deck. When an order for an engine is received, always repeat it aloud so that the Officer of the Deck is sure you have it right, and at the same time give the signal on the telegraph. As soon as the engine-room has answered this signal report immediately. As an example, the Officer of the Deck orders, *STARBOARD ENGINE, AHEAD, TWO-THIRDS.* Place the telegraph on two-thirds repeating, "Starboard engine, ahead, two-thirds." When the engine-room answers to two-thirds ahead, report, "Starboard engine answered ahead two-thirds, sir."

In case of a casualty in the engine-room, the speed may be changed by the engine-room watch without orders from the Officer of the Deck. In this case they will ring up this change in the same way you do on the bridge, and the indicator pointer will show it. This or any other change in the telegraph must be reported to the Officer of the Deck immediately and answered on his orders. Failure to do this might result in collision, loss of control of the ship, or serious trouble for the ship astern.

Destroyers and small ships have only one engine-order telegraph with the handle for the corresponding engine on the starboard and port sides of it. All ships of new construction are equipped with electrical transmission systems for both the engine-room telegraph and stand-by apparatus. They should be operated in accordance with existing instructions posted on board ship.

Messengers.—A seaman, second class, is usually detailed as messenger to carry messages for the Officer of the Deck. He must familiarize himself with the correct names of the various parts of the ship and with the names and duties of various officers and petty officers so that he may be able to carry messages intelligently; he must also know thoroughly the customs of the service, as he will often be thrown on his own resources.

In carrying a message, he should always move on the double. If called upon to strike bells, he should strike them quickly and sharply, man-of-war style. In carrying messages, he should know before leaving exactly what he should say and he should deliver the message in the exact words received from the Officer of the Deck. When the Officer of the Deck leaves the quarter-deck, the messenger should follow him at a short distance in order to be ready if needed. Under way, the messenger's station is on the conning platform; in port, on the quarter-deck, where in addition to his regular duties he can be of great assistance in performing small jobs, for example, tending boat lines. The messenger should be in exact uniform at all time and pay particular attention to the neatness of his personal appearance. He must remember that he may be of very valuable assistance to the Officer of the Deck if he carries out his orders quickly and intelligently. Other seamen, second class, are often detailed as messengers to various heads of departments; their duties are of the same general nature as the duties of the Officer of the Deck's messenger. All messengers will obey the following general rules:

1. Be in uniform of the day from 0800 until 2100, with the addition of neckerchief if it is not a part of the uniform of the day.
2. Be attentive to calls.
3. Carry messages "on the double" and return at once to the sender to report that the message has been delivered.
4. If unable to deliver the message, so report to the sender at once.
5. If sent to an officer's room knock and neither enter the room nor open the door or curtain until told to do so.
6. Obtain permission from the Officer of the Deck, or person for whom you are messenger, before going to meals or to the head.
7. Never skylark, loll, or otherwise act in an unseamanlike manner.

Sentries.—Men detailed as sentries in the Navy perform duty as follows: (all men must memorize the eleven general orders for sentries).

1. To take charge of this post and all Government property in view.
2. To walk my post in a military manner, keeping always on the alert and observing everything that takes place within sight or hearing.
3. To report all violations of orders I am instructed to enforce.
4. To repeat all calls from posts more distant than my own.
5. To quit my post only when properly relieved.
6. To receive, obey and transmit orders from the Commanding Officer, Executive Officer, the Officer of the Deck, or the Officer or Petty Officer of the Guard.
7. To talk to no one except in line of duty.
8. To give the alarm in case of fire or disorder.
9. To call the Corporal of the Guard in any case not covered by instructions.
10. To salute all officers and all colors and standards not cased.
11. To be especially watchful at night, and, during the time for challenging, to challenge all persons on or near my post and to allow no one to pass without proper authority.

Sentries at sea are usually stationed at the brig, powder magazines, shell rooms and other special posts. Except for special orders at various posts, sentries have about the same duties at a station as aboard ship.

Orderlies.—The following rules are given as typical instructions for the Captain's orderly; instructions for other orderlies differ only in minor details:

1. Remain at all times in the vicinity of the cabin door, unless sent away on a message by the Commanding Officer.
2. Accompany the Commanding Officer whenever he leaves the cabin, unless otherwise directed by him.
3. Never start on a message without a thorough understanding of what is desired. The same applies in delivering a message to the Commanding Officer.
4. Allow no one to enter the cabin door without authority, except the Executive Officer and the Navigator. This order may be modified by the Commanding Officer.
5. All messages from the bridge or the radio room must be delivered to the Commanding Officer without delay, regardless of the hour, unless he has given orders to the contrary.
6. Carry out general orders for sentinels on post.
7. Allow no one, except the gunner, to take the keys to the magazine from the cabin without special authority from the Commanding Officer. Report to your relief how many magazine keys are out and at 2000 report to the Commanding Officer whether or not all the magazine keys are in their places.
8. Turn the order book over to your relief in the presence of the Petty Officer of the Guard.
9. When visitors are allowed on board, do not allow them to loiter in the vicinity of the cabin. Give necessary instructions courteously but firmly.

Life-buoy lookouts.—The life-buoy lookouts keep station at their respective life buoys and drop them overboard on order from the Officer of the Deck. In the absence of orders, they should be dropped as near as possible to the man who is overboard; however, care must be taken not to drop the buoy on the man. If the buoy is dropped without orders, the lookout should repeatedly call, "Man overboard!" As soon as the buoy is let go, lookouts should endeavor to keep the man in sight. Do not sacrifice the chance of getting the buoy close to the man by waiting too long for orders from the Officer of the Deck;

he may not know that a man is overboard, or may be too busy preparing to rescue him to issue the order immediately.

Fog buoy or towing spar watch.—The fog buoy, also known as the position buoy and towing spar, is an object which may be easily towed and will throw a visible spray. When cruising in formation in a fog this type of buoy may be used by each ship to assist the ship astern in keeping position. Unless orders are given to the contrary, it is towed astern with the length of the tow line 10 yards less than the amount of open water between ships at correct standard distance. A rag is fastened about the tow line to indicate this distance. When this rag comes to the taffrail, the towing spar should be in proper position astern.

As a rule, a petty officer and two men handle the spar and line. A point to remember is that in case a vessel backs, the line must be reeled in promptly, without waiting for orders, or the line is liable to be cut. A searchlight is usually kept turned on the spar, by day or night, to assist the next ship astern in formation in seeing the buoy. Lookouts are posted, as mentioned before, to keep watch on the towing spar of their own vessel and that of the ship next ahead.

Anchor watch.—The anchor watch is a detail of men who stand watch in port from 2100 to turn-to. On large ships, the watch proper consists of about 12 to 14 seamen and a petty officer. It varies with different ships, but frequently has, in addition to the seamen, an electrician's mate, a gunner's mate, a carpenter's mate, a bugler, and even representatives of other departments. The seamen stand 2-hour watches in pairs, replacing the day messengers. All other men may sleep, but are subject to call for any immediate emergency, such as manning the lifeboat, housing awnings, hauling over hatch hoods and veering chain. The watch is usually required to sleep in a compartment adjacent to the quarter-deck, commonly known as the anchor-watch compartment, and a man must not change his sleeping place once it has been selected and pointed out to the Petty Officer or to the man whom he is to relieve. It is a very serious offense for a member of the anchor watch to sleep off his regularly assigned billet. Doing so would cause confusion in calling the anchor watch, and the watch would never be assembled in time to meet an emergency.

Men for the anchor watch are usually detailed from the duty section of the deck divisions for each day. Their names are turned in to the officer responsible for the anchor watch, the Executive Officer's office or the First Lieutenant's office, by the division's leading petty officer, with the approval of the division officers. The responsible officer than makes out the official list with the watch each man is to stand and posts it early in the afternoon.

Under no circumstances shall a seaman, standing one of the assigned watches, leave the quarter-deck at any time unless he has obtained the necessary permission from the Officer of the Deck; likewise, he must obtain such permission before calling his relief. Nor shall an anchor watch turn in until he and his relief have reported to the Officer of the Deck, and he is usually required to turn over the duty in the presence of the Officer of the Deck.

Deck division watches modified during the war.—Since the beginning of the war, watches such as the speed cone watch and the speed flag indicator watches are stood only on entering and leaving port. Fog whistle signals and fog bell signals have been eliminated.

Speed cone watch.—Upon the accurate and prompt execution of your orders in regard to the speed cones depends, in great measure, the accurate position of the ship astern of yours in formation; therefore, your duties are most important, and you must handle the cone smartly and not in a careless manner. If you are slow or careless in the performance of your duty, you may be directly responsible for a collision.

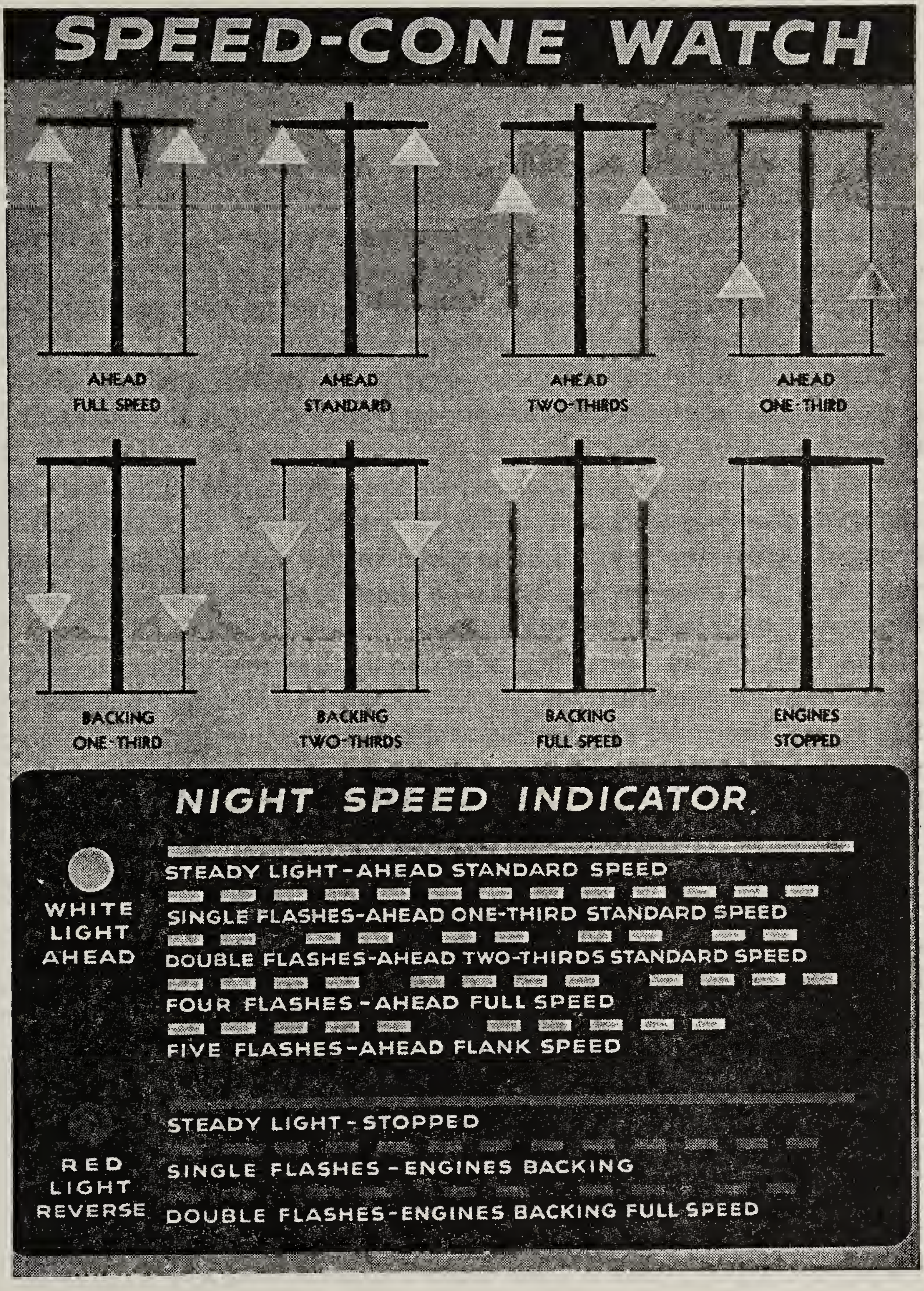
The use of speed cones is normally discontinued when clear of the harbor. They are hauled down together on orders of the Officer of the Deck, and usually with the execution of the signal by the flagship which authorizes their discontinuance.

The speed pennant, a red pennant, may be hoisted at the dip, either with or without the speed cone, to indicate full speed, and two-blocked to indicate flank speed.

Night-speed-indicator watch.—Meanings of light are as follows:

White light. Steady light: Going ahead at standard speed.
Single flashes: Going ahead at one-third standard speed.
Double flashes: Going ahead at two-thirds standard speed.
Four flashes: Going ahead at full speed.
Five flashes: Going ahead at flank speed.
Red light: Steady light: Stopped.
Single flashes: Engines backing at ½ or ⅔ speed.
Double flashes: Engines backing at full speed.

During wartime, ships steaming in formation at night use a screen



SPEED-CONE WATCH

NIGHT SPEED INDICATOR.

WHITE LIGHT AHEAD

STEADY LIGHT-AHEAD STANDARD SPEED

SINGLE FLASHES-AHEAD ONE-THIRD STANDARD SPEED

DOUBLE FLASHES-AHEAD TWO-THIRDS STANDARD SPEED

FOUR FLASHES-AHEAD FULL SPEED

FIVE FLASHES-AHEAD FLANK SPEED

RED LIGHT REVERSE

STEADY LIGHT-STOPPED

SINGLE FLASHES-ENGINES BACKING

DOUBLE FLASHES-ENGINES BACKING FULL SPEED

FIGURE 26-3.

speed light when so directed. This is a white light and shines out through a tube mounted on a frame on the main mast or some part of the ship aft, where only the ship directly astern may see it. The light is controlled from the night speed indicator and is kept trained on the ship astern. The signals used for indicating the speed of the ship are the same as those on the night speed indicator.

Flag-speed-indicator watch.—During daylight, the speed of ships steaming in formation is indicated by the use of small flags. On large ships one of these flags is flown from each wing of the bridge; on destroyers one only is flown, and usually just to starboard of the mast and above the level of the flying bridge.

Flag speed indicators show the speed to the nearest knot, although destroyers sometimes use the answering pennant, under the indicator, to show half-knot speed.

Speed flags are very important to the ship astern and must be changed promptly and accurately. If possible, the flags should be changed before the new speed is given to the engine-room of your ship, to enable the next ship astern of yours in the formation to catch the change of speed at the same time.

The rack in the speed-flag bag usually has the letter and corresponding speed marked on it, over the slot in which that particular flag hangs. However, to stand a speed-flag watch intelligently the appearance and name of each flag, with the speed it indicates, must be learned, as the flags must be stowed and may get in the wrong slot. They must be checked before hoisting to prevent the wrong flag being hoisted through faulty stowage or otherwise.

Fog-whistle and fog-bell watch.—In fog, falling snow or heavy rainstorms, whether by day or night, a steam vessel having way upon her is required by Rules of the Road (International) to sound at intervals of not more than 2 minutes a prolonged blast (4 to 6 seconds' duration) on the fog whistle. A steam vessel under way, but stopped and having no way upon her, is required to sound at intervals of not more than 2 minutes two prolonged blasts, with an interval of about 1 second between.

In formation the leading ship sounds the signal first and the others follow in succession, with sufficient interval between to prevent 1 blast from each of 2 ships sounding like 2 blasts from 1 ship, or similar confusion.

If you are detailed for the fog whistle, report on the bridge immediately and carry out any instructions that may be given you. Remember that if you are not strictly attentive to duty you may be directly responsible for loss of ship and life.

At anchor the ship's bell is rung rapidly for about 5 seconds, at intervals of not more than 1 minute. A man is detailed for this watch at the fog bell; his duties are explained to him and he must carry them out carefully and conscientiously. If other men-of-war are present or expected, it is customary to strike the ship's call numerals each time the bell is run.

How to relieve a watch.—Watches must always be relieved on time. In reporting for watch duty, you should arrive at least five minutes ahead of time in order to receive any necessary information from the individual being relieved. You should go to the section leader, the individual in charge (boatswain's mate of the watch on quarter-deck or bridge watches) or the man being relieved, in accord with your instructions, and report that you are ready to relieve the watch. When reporting directly to the person relieved, you might say, "I am ready to relieve you." You will then receive any necessary information. When you are sure that you understand conditions and are clear as to your instructions, you can say, "I understand, I relieve you."

LOOKOUT WATCHES

The lookout's responsibility.—A lookout is a man who searches for ships, planes, land, rocks, shoals, periscopes, discolored water, buoys, beacons, lighthouses, floating objects, or anything else of interest to the Officer of the Deck. Lookouts are the eyes of the ship. Safety of the ship and the men aboard depends on them. The lookout must sight the enemy first, report quickly and intelligently and give his ship a chance to defeat the enemy. The lookout can greatly reduce chances of having to swim the cold waters of the North Atlantic or the shark-infested waters of the South Pacific by being on the job at all times.

You can readily see that one of the most important duties you will be asked to perform when your ship is at sea is lookout duty. All hands are depending on you to see and report what you see. In a battle the ship which gets in the first shot or torpedoes has a decided advantage. It will be your duty to be sure that your ship has this advantage. You must search your sector carefully and report instantly everything you see or think you see. There must be no delay between your sighting the object, ship or plane, and your report to the Officer of the Deck. Every second is important. The loss of a few seconds may mean the difference between life or death.

Do much more than keep your eyes open and look. You must learn how to search in a way that will inspect every inch of the area assigned to you. Also, you must learn how to report the location of the object so that the Officer of the Deck will know where to look.

Specific nature of lookout duties.—The number of lookouts, their spots and the sectors they are to search vary with the type of ship and conditions. As you know there are 360° in the circle. On a small ship you might have to cover anything from 90° to 180° or one-fourth to one-half of the circle. You alone will be responsible for seeing and reporting everything that appears in that area. If you don't see it, nobody else will.

Lookout watches vary in length. Two hours during the day and one-half hour at night are usual assignments.

On larger ships lookouts are classified as (1) *Horizon* to scan distance; (2) *Surface* for objects close aboard, and (3) *Sky* for aircraft and weather warnings. The higher the position, the more area the lookout covers.

You can make a rough judgment of the distance of an object from the ship by guessing its relation to the horizon. When looking from the water's edge, the horizon is 2.8 miles distant; when looking from a mast which is 115 feet above water it is 12.3 miles away.

When on lookout duty you should not "sweep" the horizon. Examine the field, five degrees at a time. Navy 7-50 binoculars cover 7 degrees, so that overlap may catch an original miss. When the field has been covered, return to the starting point and begin again.

Making of reports.—Great care is needed in making reports. The slapping of the seas against the ship's sides, the blowing wind and other noises about a ship will garble a report. The Officer of the Deck or the telephone talker should never have to question a report given. Therefore, sing out in a good loud tone.

Objects seen are located by the angle formed by the line of sight and the bow of your ship. This is called a relative bearing and will be explained later. If you sight an object in any given bearing—say zero two zero—and you cannot tell what it is, you report, "Object zero two zero, range 4000 yards. I cannot make it out, sir." Should you identify the object as a battleship, you will report, "Battleship, zero two zero, range 4000 yards, sir." Notice that you have used a small number of words, but they give the Officer of the Deck the whole story. You must be certain that the Officer of the Deck acknowledges your report. Your first duty as a lookout is to sight the object and report it. The second duty is determining what the object is.

Lookouts may report objects that don't exist. After reporting two or three objects that don't exist the lookout may become embarrassed and decide to be doubly sure before reporting again. This is a mistake. Report whenever you sight an object. If it doesn't exist, no one is harmed. The time you take to hesitate and to report may mean that the enemy has been met. He may have seen you and will not hesitate to report your presence. He gets the first shot in and the advantage is his.

After reporting an object, lookouts often make the mistake of concentrating on it. As a result they don't see other objects in their area. As soon as the report is given, the Officer of the Deck immediately searches the horizon in the bearing given and acknowledges the object reported. As far as that object is concerned, the lookout has done his job. If both the Officer of the Deck and the lookout concentrate on one object, the rest of the sector will be unwatched. If one enemy ship is sighted, there are probably two or three in the same general area. An aircraft carrier or battleship is almost certain to be escorted by destroyers. If they slip in on you from an unwatched part of the sector, your ship will not have a chance. Remember this when you are a lookout. As soon as the Officer of the Deck acknowledges seeing the object you have reported, look away from it and search the rest of your sector.

Relative bearings.—Every lookout must have a knowledge of relative bearings. Without it he will be unable to report what he sees. Unless he is accurate and speedy in determining the location of an object there is likely to be a disastrous delay in reporting. You will want to be thoroughly familiar, therefore, with bearings so that you can report properly.

A relative bearing is the angle formed by the line of sight to the object seen and the line which is the course of your ship, measured clockwise. Picture your ship as being at the center of a circle as in the illustration showing sectors of bearing on page 288.

Compare relative bearings to the hours and minutes of a clock. The

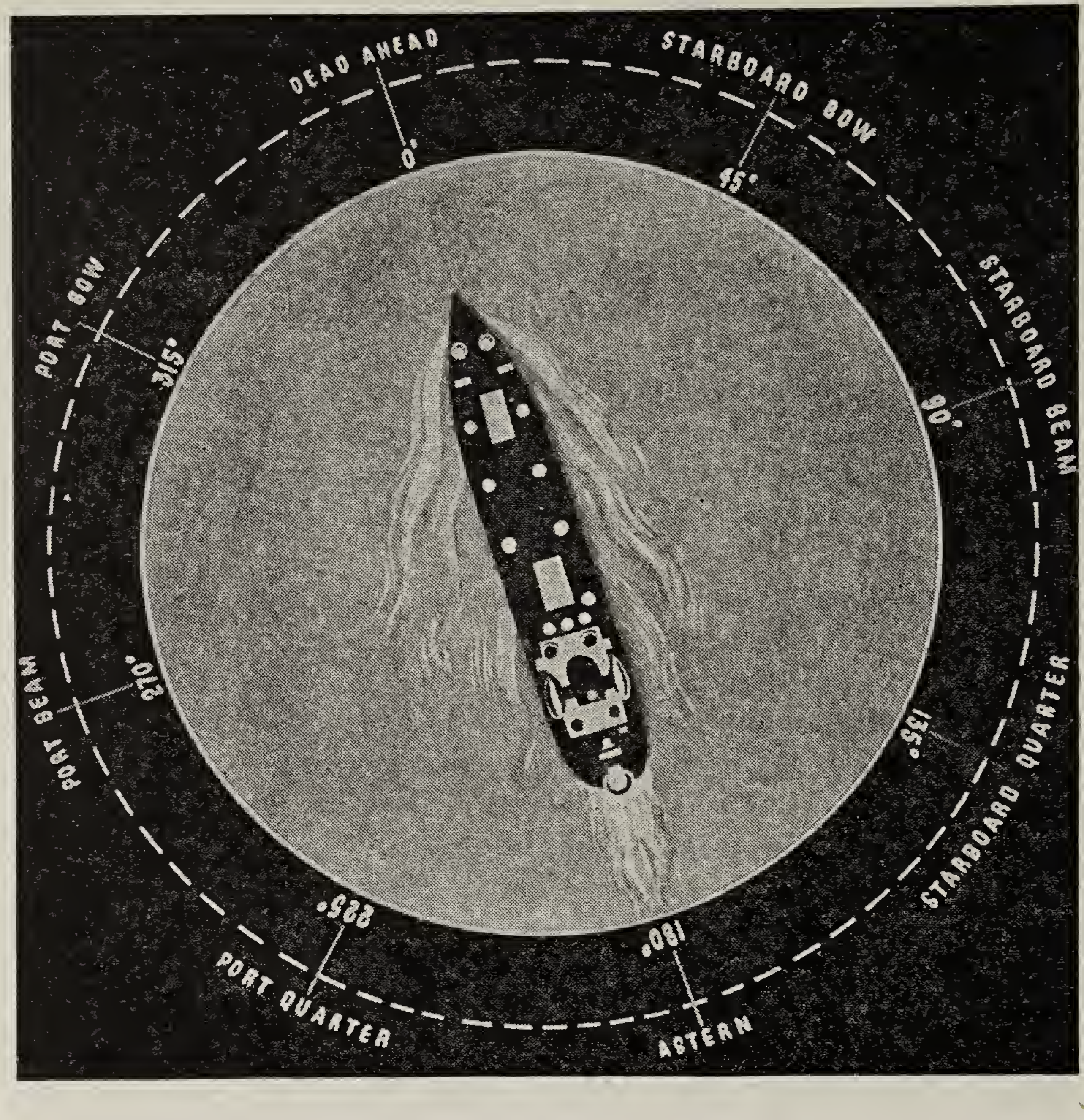


FIGURE 26-4.—Sectors of bearing.

bow at 12 noon = 000°, the stern at 6:00 = 180°. You can multiply each hour by 30° to get the relative bearing. Thus, the relative bearing of an object at 6:00 is 30° × 6 = 180°. You can practice this, assuming that objects are at different times. Eventually, of course, you will want to be able to estimate the location of objects as zero two zero, zero nine five, or one nine five without reference to the time as indicated by a clock.

Practice reading bearings as you go about the station. Fix an imaginary position for the bow of the ship and read the location of the barracks, men or gear which may be within sight.

Aircraft are located in a similar manner, although a vertical angle must be added. Thus, the surface straight ahead is reported as 00°, that directly above is 090°.

Night lookouts.—To be a good night lookout, a man must try hard. Night lookout duty is fatiguing and boring. There is nothing entertaining about scanning a dark horizon for half an hour. It is easy to "doze off," to start thinking of what will happen on next liberty. A lookout who is not alert might just as well be blind.

One incident after another has proved the value and importance of night lookouts. In the South Pacific many night battles have depended on whether or not the enemy was spotted before he sighted us.

Your eyes at night.—Have you noticed how long it takes to find an empty seat in a movie if you come in from the bright sunlight? It may take you even longer to be able to recognize a friend. Gradually, however, your eyes become sensitive to faint light.

If you have gone into a dark room or have been out on a very dark night you have had a similar experience. If you leave a lighted compartment and go out on deck on a dark night, you are blind until your night vision is built up enough in sensitivity for you to see. A line or swab that trips you because you can't see it will stick out like a sore thumb 20 minutes later. Thus a night lookout is of no value until his eyes become used to the dark.

You may think that ordinary seeing is involved, but this is not the case. Actually you use one part of your eyes for seeing in the daytime, and another part for seeing at night. Sense cells called the *cones* are used in the daytime. Others, called the *rods* are used at night. Actually it takes a full half hour of darkness for the rods to reach the peak of efficiency.

The cruiser *Vincennes* is reported to have been lost because of this problem. Japanese ships were lurking behind an island; knowing when our lookouts changed, they emerged from hiding at the appropriate moment. Our lookouts were not adjusted to the dark and did not see them until it was too late.

Getting ready for night lookout duty.—You can see that it is important to get ready for night lookout duty. One way of doing this is to go on deck a half hour ahead of your watch or stay in a dark room until your eyes become adapted. Another method is to use night goggles. The Navy provides tight-fitting goggles with red lenses which are excellent for adapting your eyes to darkness. Your rods can't use red light, but your cones can. Thus, you can see with your cones, but the rods will be in the dark getting back their sensitivity. The goggles are not perfect; they are merely an aid in dark adaptation.

When in company with blacked-out ships, ship pilots and bridge officers often have to go back and forth from a lookout post to a lighted bridge or chartroom. When it is necessary for them to go into lighted compartments, wearing night goggles prevents the loss of night vision.

There may be occasions when there aren't any red goggles handy, and you have to look at a fairly bright light. When that happens, cover one eye up and use the other. The one you use will lose its sensitivity, but the other one will still be all right.

It is very important to avoid looking at lights when you are on night lookout duty. A bridge light literally blinds you. Striking a match to light a cigarette may ruin your night vision for another half hour. The objects you are there to see aren't lighted. They are very, very dim—so dim that the little light that comes from a radium dial wrist watch will blind you to them.

Using your night-eyes.—Your night-eyes are very sensitive and they work differently from your day-eyes. As a night lookout, you want to learn to use them. A few suggestions may be useful.

One of the strangest things about night vision is the fact that you can't see an object by looking straight at it. You must look above it, below it, or to the left or the right if you are to see it at all. A night lookout should not look at the horizon, but above it. If you use binoculars to spot objects, you should not look straight through them; if you do, you can't see.

A simple experiment will help to explain this. After you have been in darkness for 15 minutes, hold your finger up, at arm's length, and look steadily at it. It will disappear. Look a little to one side and it will appear again. If you keep staring, it will be gone again. Move your eyes to the other side and it will reappear. Practice will be necessary to get on to this trick of seeing things at night without looking directly at them.

Night-eyes are slow in responding. Don't sweep the sky or horizon as you can't see well while the eyes are moving rapidly. Scan the sky or sea slowly. Night-eyes are slow in reacting and you may not notice an object until you have looked near it several times.

Your eyes can pick up a moving light more easily than one that is standing still. You can use that fact by keeping your eyes moving slowly over the region you are covering. In that way you will pick up objects you would otherwise miss. When an object appears, move your head from side to side. This will give the object the appearance of movement even though barely seen.

Small objects cannot be seen with your night-eyes. Hence, night glasses or binoculars are necessary. Night glasses magnify without cutting down on the light which gets to the eye and so may be preferable to binoculars. It is highly important, however, to keep glasses clean. Scratches or moisture tend to scatter the light.

With your day-eyes you can read and see colors. When your night-eyes are working you are color-blind. A light, no matter what its color, looks gray to the rods. Unless a light is bright enough to make your cones work, you will be unable to detect color. Your day-eyes work best with yellow light, but can use red and blue. Your night-eyes work best with blue-green.

When using your night-eyes, you can't see sharp images and make out detail. You cannot expect to get a good focus or to see things clearly.

It takes practice and care to become a good night lookout. Follow these rules for using your eyes at night.

1. Don't try working at night until you are dark-adapted.
2. Avoid *all* light but *red* light.
3. When seeking an object on the horizon at night, always look for it out of the corner of the eye. Practice this constantly.
4. Scan the region you are investigating. Be alert for any objects. Practice scanning as much as possible.
5. If you must go into a lighted place, either blindfold yourself or wear the red dark-adaptation goggles which are obtainable, and which permit one to see without disturbing dark-adaptation.
6. Avoid looking at instrument panels which are illuminated by other than red light. Never stare at light instruments.
7. Use aids, such as night binoculars, as much as possible.
8. Keep all your optical equipment clean.
9. Don't keep looking at something you've already spotted.
10. *Above all*, keep in good physical shape. Fatigue and alcohol seriously hurt night vision.

CHAPTER 27

Cleaning, Maintenance and Painting

Every man on board ship is assigned duties at a cleaning station. When each man does his share to prevent dirt and all men clean their stations thoroughly, little work is necessary to keep the ship spotless. In peacetime, all parts of the ship are inspected daily for cleanliness, neatness and upkeep. Though the number of inspections may vary on different ships in time of war, peacetime standards are

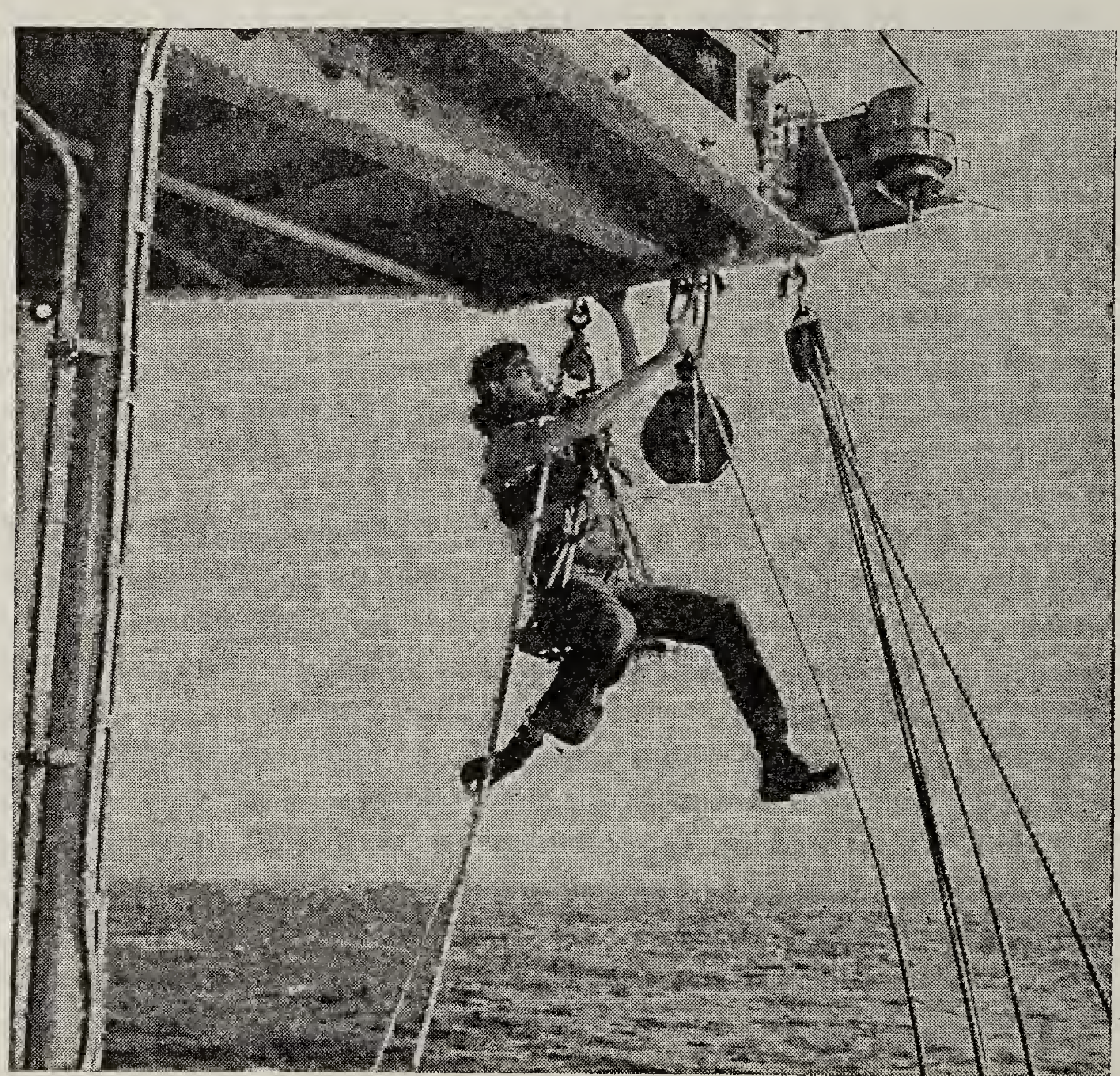


Figure 27-1.—The boatswain's chair.

upheld. In fact, the upkeep of fittings and equipment and cleanliness of the ship are most important in battle conditions.

CLEANING THE DECK

Sweeping.—When sweepers are piped they man the brooms and sweep down the parts of the ship assigned them. The sweepings should never be swept into a scupper, but always into a dustpan, and then should be thrown into the trash or slop chute. The sweepers also clean out all spit kits and wipe off all ladders. The spit kits are taken to the head, emptied and washed out, and about 1 inch of water put in them before they are returned to their places. All ladders in the ship should be wiped off with a damp swab.

Swabbing.—The various top side decks are wet down with clean salt water. This is done by use of small rubber wash-deck hose led from hydrants on the fire main. Every part of the deck is wet down thoroughly. While washing decks, if the temperature permits, the crew will take off shoes and socks. In cold weather rubber boots are worn while washing down. The word is passed *Scrub down the deck* or *Scrub down the deck with sand.* A thin sprinkling of sand is used with the last named method. For washing down, long bristle scrub brushes are used. Care must be taken to get into every nook and corner and wash all dirt, sand and soap off the deck into the scuppers. Corn brooms should never be used on a wet deck as they are immediately ruined. When the word *Dry down the deck* is passed, men with squilgees form abreast and go down the deck shoving the water before them. The squilgee gets most of the water off the deck. A swab is used in the wake of the squilgee to wipe up the remainder and to remove water from corners and deck sockets.

Special notes on scrubbing.—*Paint work.*—In cleaning paint work, sand and canvas take off the paint as well as the dirt unless great care is taken. Fresh water and very little soap will often save much work. Lye "eats off" paint and should not be used. Rust spots can be removed by canvas and fresh water if care is taken. Greasy dirt is the hardest thing to remove. For that reason care must be taken by every man to keep the paint work clean. After washing down decks, all paint work that has become wet must be wiped dry. If this is not done, the drops of salt water will evaporate and leave the paint work speckled with white salt marks which are very untidy and hard on the paint.

Linoleum.—Never let water stand on a linoleum deck, as it will soak into the cracks and soon loosen it from the deck, besides causing serious deck corrosion.

MAINTENANCE OF SHIP'S EQUIPMENT

Linoleum.—Lukewarm fresh water, soap powder and creosote are used to clean linoleum. About once every quarter, the linoleum is rubbed with linseed oil to renew its life and give it resistance to the frequent application of water and creosote. If wax has been applied to linoleum, it is not necessary to oil it. For brightening up and maintaining a standard color, in officers' quarters, preservative stain may be used. Also in officers' quarters and other spaces not exposed to the weather or heavy traffic, wax is used to give the linoleum a good coating and polish. Before applying wax, the linoleum should be dry. The wax should be applied in a thin coat and well rubbed in to avoid tracking. A special linoleum seam cement is used in cracks to prevent water getting under the linoleum.

Brightwork.—This is the term applied to all metal objects, whether steel or brass, that are to be kept bright by polishing. Brightwork polish should be used sparingly and all trace of it carefully removed after polishing. Care must be taken not to leave stains on the paint work or gaskets. On gun bright work the use of emery cloth is strictly forbidden except when used under the immediate direction of the battery officer. Bright-work gear must be carefully stowed in the place set aside for it immediately after knocking off bright work. The rags and polish should not be stowed in voice tubes or left about the decks.

Electrical equipment.—Never attempt to alter or repair any electrical gear unless it is absolutely necessary; electrician's mates are trained for this duty. Never touch a live line, and be especially careful around any electrical apparatus if your hands are wet, or if it is necessary for you to stand in water. Never paint screw threads, label plates, hinges, etc. of electrical fittings.

Fire hose and canvas.—Never use sand on fire hose or scrub it on a sandy deck, as this wears it out very quickly. Fire hose and canvas should be scrubbed with soap and water and thoroughly rinsed with salt water. Hose and canvas must be triced up and dried thoroughly before being stowed away.

Ventilators and air ducts.—All ventilators and air ducts should be inspected periodically and cleaned out to prevent the accumulation of rubbish and trash. They shall not be used as stowage spaces.

Gaskets, dogs, air ports.—Rubber gaskets as used for water-tight, weather-tight and air-tight purposes shall not be painted. The metal-bearing edges which come in contact with the gasket should be kept free from rust, grease and paint. They should not be emeried. The dogs, dogbolts, nuts, hinges and hinge pins or other parts of water-tight doors, hatches, manholes and air ports upon which the water-tight security of vessels depends shall not be removed except for the purpose of repair or adjustment. The removal of these parts for other purposes, such as cleaning or polishing, is prohibited, as this practice often results in the loss of the parts or their replacement without being correctly adjusted.

Tarring down.—Wire rigging is protected by being galvanized. Rigging must be tarred down when it dries out and turns a brownish color. The man doing the tarring rides up and down the rigging in a boatswain's chair. He should inspect carefully to see that the line used to support his boatswain's chair is not weak at any point. Tar is applied with a rag. It must be handled with care to avoid getting spots on the deck, awnings or paint work.

PAINTING

Object of painting.—Paints and varnishes are used to protect and decorate surfaces. The protection of metal surfaces is the chief object of much of the painting done on warships. How important this protection is may be seen by the rusted, scaling sides and fixtures of any ship on which the painting has been neglected or poorly done, even for a short time.

Keeping a warship in first-class condition means a constant battle against rust, and the only effective protection against rust is good paint properly applied to metal surfaces that have been carefully prepared for painting.

Preparing surfaces.—Next in importance to a well-mixed paint is the careful cleaning of the surface. The most expensive paint will be of little value if it is applied on an insecure foundation. If loose old paint, rust, dirt, dust, moisture or grease exist on the surface, they will prevent the new paint from adhering to the surface.

When painting steel, it is very important to remove all scale, grease, rust and moisture. Rust has the property of spreading and a small spot of rust on the metal may spread under the surface of the paint until in time the paint will flake off. For this reason it is essential that all traces of rust shall be removed. Deep-seated rust

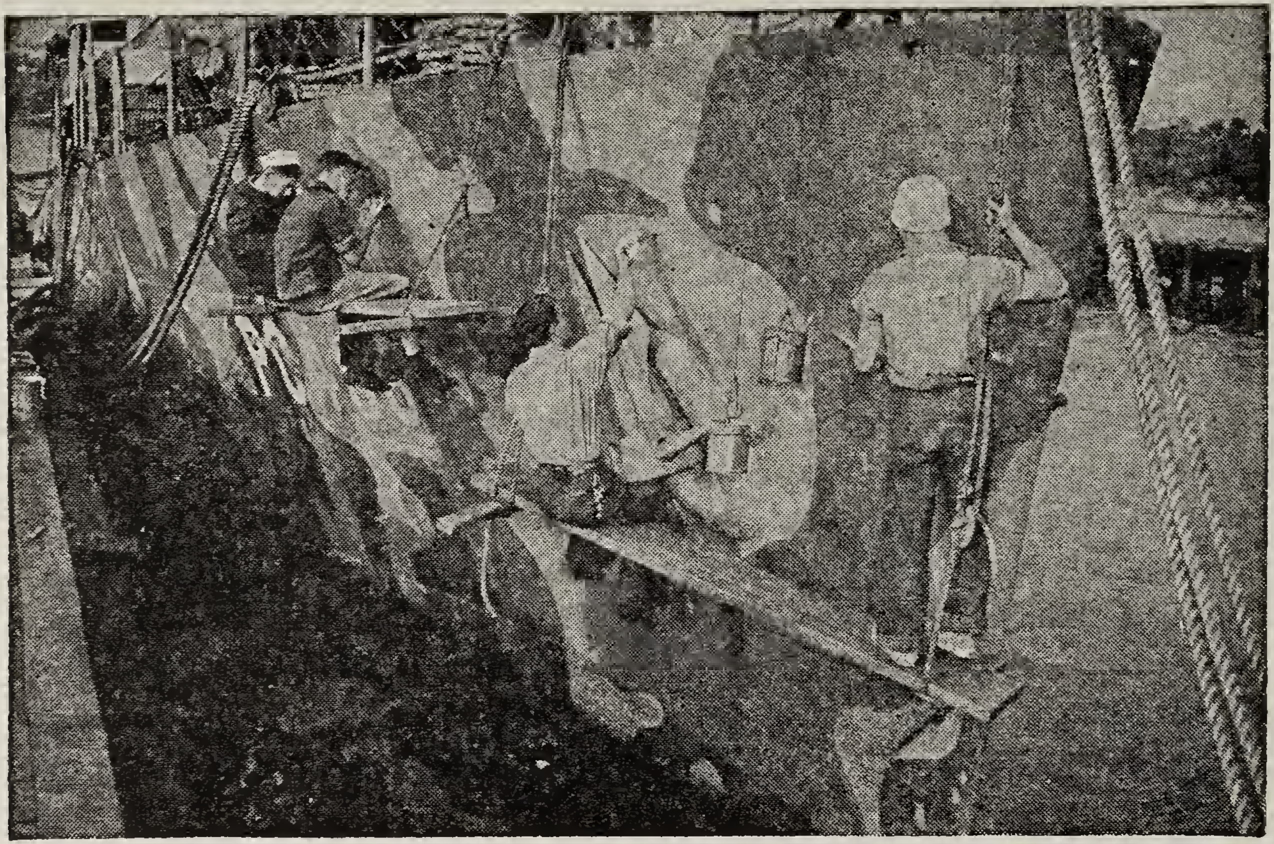


FIGURE 27-2.—Painting over the side.

spots may be removed by applying heat from a painter's torch. The heat converts the rust into another form, which is harmless and can be dusted off easily.

Burning off oil paints is dangerous if the burnt-off part of the paint is allowed to remain on the floor where it may be powdered by being stepped upon. The flame of the torch should not be allowed to play long enough on the surface of the paint to produce a smoke. The heated oil fumes may cause headache. Fine particles of lead may be carried mechanically along with the flames and thus be inhaled.

Application of paint.—As most painting on board ship is done by brush, only this method of application will be considered. The following advice will be of value if properly followed:

1. Hold the brush by the handle and not by the stock. If the brush is held by the stock the hands become covered with paint, which may cause poisoning, especially if small cuts are exposed and lead paints are used.

2. Hold the brush at right angles to the surface, with the ends of the bristles alone touching, and lift it clear of the surface when starting the return stroke. If the brush is held obliquely to the surface and not lifted, the painted surface will be uneven, showing laps and spots and a generally dauby appearance.

3. Do not completely fill the brush with paint. Dip only the ends of the bristles into the paint. Do not charge the brush with paint until the preceding charge has become sufficiently exhausted.

4. Apply the paint with long strokes parallel to the grain of the wood. When painting along smooth surfaces, draw the brush along the whole surface if convenient, so that there will be fewer breaks in the lines.

5. Cross the work by laying off the paint over a small section with parallel strokes and then crossing the first application with parallel strokes at right angles to the first ones. A medium pressure should be applied during the crossing and a light pressure during a final laying off. All final laying off should be in the length direction of the work.

6. When painting an overhead surface, the ceiling panels should, as far as possible, be laid off fore and aft and the beams athwartship. Where panels contain a great many pipes running parallel with the beams it would be difficult to lay off the ceiling panel fore and aft. In such cases better results will be obtained by laying off parallel with the beams.

7. When painting vertical surfaces, bulkheads, etc., the work should be laid off vertically. In all cases each succeeding coat of paint should be laid off in the same direction.

8. Keep the paint in the pot well mixed while the work is proceeding.

9. Remember that paint applied in too heavy a coat will show brush marks and will give an uneven finish. Better results will be obtained by applying two coats of thin or medium body paint than one coat of heavy paint.

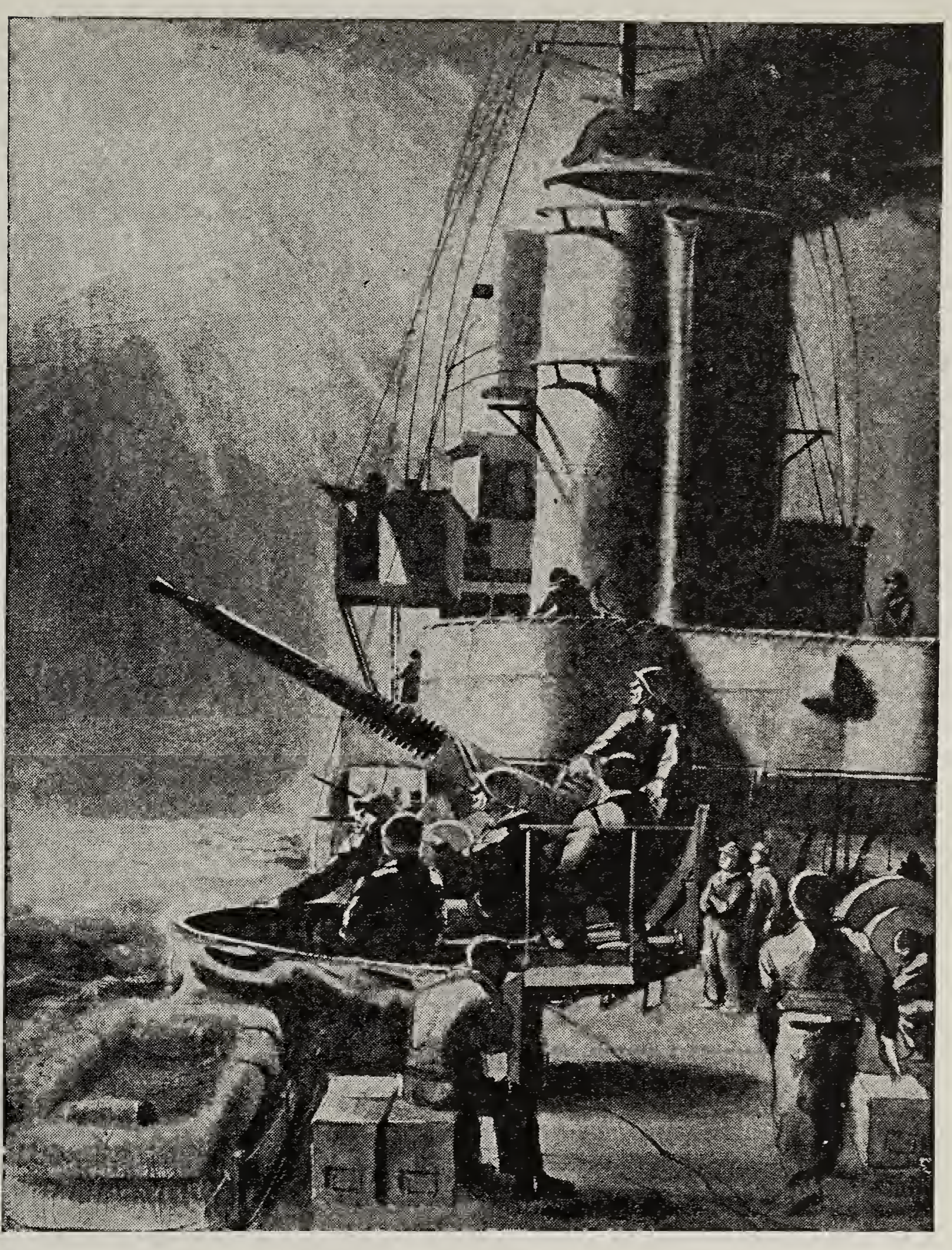
10. Do not apply a succeeding coat of paint before the previous coat is sufficiently dry. A paint dries because of its contact with the air, and the drying of the first coat will be retarded if the second coat is applied too soon.

11. Some paints containing lead may have poisonous effects. If a gas mask is prescribed for a certain job of painting, be sure to wear it.

Varnish.—After the surface to be varnished has been thoroughly cleaned, filled and rubbed off, varnish is applied with a brush in the form of a uniform coat by crossing the work and allowing the varnish to flow in a smooth coating. It is essential that the surfaces be thoroughly cleaned from all dust particles, as these show plainly in the varnish. Three days should be allowed to intervene between coats, and three coats should be applied on all new work. Do not apply the varnish too thick, as it will not dry underneath. The outer surface will dry first, forming a skin which will prevent the varnish underneath from drying because it cannot come into contact with air.

Bottom paints.—The only bottom paints now used are the anticorrosive and antifouling paints which are manufactured at Navy yards. To prevent the destruction of steel plating by corrosion, a rust-preventive coating known as anticorrosive paint is applied next to the steel hull. Antifouling paint containing oxides of copper and mercury prevents fouling of the ship's bottom by marine growths. The antifouling paint is always applied over the anticorrosive paint film. The anticorrosive paint dries very quickly because of its quick evaporating properties, and for this reason an operator must take care not to keep painting over one spot and thereby build up a thick coating. The paint should be applied with short, rapid strokes while the operator progresses steadily over the area to be painted. Four hours is generally considered a sufficient interval of time between the coats of anticorrosive and antifouling paint. As in the case of the anticorrosive, the antifouling paint contains heavy metallic pigments. These impart to the paint its antifouling properties and must not be allowed to settle. Stir the paint frequently.

Paint brushes.—The bristles of a paint brush may be tightened by holding the brush in a vertical position with the bristles pointing up and wetting the end of the wooden handle inside the bristles with about a teaspoonful of water, then allowing about half an hour for the handle to swell. A paint brush after use should be thoroughly cleaned in turpentine, or soap and water. If left in water for any length of time, the bristles are liable to twist and lose their elasticity. After cleaning, the brush should be kept in a trough containing a sufficient quantity of raw linseed oil to cover about one-half the length of the bristles. Shellac brushes should be kept in a small amount of mixed shellac or alcohol. Never put them in water. If the brush is not required for use in the near future, clean it in alcohol.



PART 6

EMERGENCY DRILLS AND BATTLE STATIONS

CHAPTER 28

Emergency Drills

NATURE OF GENERAL DRILLS

On board ship every man takes part in general drills. He has a station for each drill, and may play an active part or perhaps merely stand at quarters waiting to be assigned as a relief. General drills include general quarters (battle stations) and all emergency drills. Emergency drills include collision drill, fire drill, abandon ship drill, fire and rescue drill and plane crash and salvage drill. No man is excused from any of these drills unless permission has been granted by the Executive Officer of the ship through the department head. Unless you are doing emergency work, you have no reason whatever to request an excuse.

General drills develop teamwork so that every department, every division, every section and every man knows and does exactly what must be done in every emergency. Lack of teamwork causes confusion and inefficiency and courts disaster. The highly mechanical nature of the modern fighting ship makes it a necessity that the crew be well-organized and prepared for all eventualities by knowing where to go, what to do, from whom to take orders and how to cooperate with the various other units aboard ship.

Your duty at your station, although it may seem unimportant, is a cog in the whole machine. At all emergency drills do the duty assigned your station quickly, thoroughly and efficiently. Help to develop unity of action and teamwork that is indispensable to proper fighting efficiency.

Silence is the first law on a well-drilled ship. Those in authority are the only ones who should speak. Every man goes to his station *on the double.* If it so happens that a man has no specific duties, he goes to his quarters and remains quiet. In each division stations and duties are assigned on the basis of the watch bill by squads or sections. The ship's organization provides for all conditions so that every job can be done even in the absence of considerable numbers of the crew, as may be likely when the ship is in port or in dry dock. Complete preparation is assured at all times.

During emergency drills at night, if your hammock is swung in a gangway swing it clear by taking one turn of the lashing around one turn of the hammock.

For all general drills general alarms are sounded throughout the ship. This is followed by bugle call for the proper drill.

After an emergency drill "secure" is sounded on the bugle. When all divisions have gone to quarters and reported secure, "retreat" will be sounded on the bugle.

On ships whose complement does not include a bugler, after the general alarm has been sounded the call is passed by word of mouth. Reports are made over voice tubes or by messenger to the bridge.

WATERTIGHT INTEGRITY

The most important thing about a ship under any circumstances is to keep it watertight. It may sustain any degree of damage, but if the proper degree of watertight integrity is maintained, the ship will be kept afloat.

Doors, hatches and manholes giving access to all compartments must be securely dogged. Double bottom manhole covers should be dogged at all times except when they must be open for inspection, cleaning or painting. They must never be left open overnight or when men are not actually engaged in work.

General drill orders call for closing during maneuvers, in fog, or as a matter of routine at night all watertight doors, hatches and ventilator openings designed to be closed.

DRILL DUTIES

Every man must have a general knowledge of the duties performed by each department on his ship for each drill. He must know the calls and know in detail his own duties and the duties of his division for every drill.

Fire drills.—

The calls.

1. Emergency signals.
    a. General alarm.
    b. Ship's bell rung rapidly, followed by designating number of strokes to indicate location.
    c. "Fire quarters" on the bugle, followed by the same number of blasts to indicate location.

d. Word passed by the boatswain's mate as to location.

2. Secure signals are sounded on bugle, by boatswain's mate or over the interior communication system.

Any person discovering fire on board ship extinguishes it or prevents the spread of flames. Use is made of fire extinguishers and other special appliances immediately available. Word is sent at once to the Officer of the Deck.

Officers' stations and duties.—

1. The Executive Officer is in charge at the scene of fire.

2. The Gunnery Officer stations men prepared to flood threatened magazines or shell rooms at flood cocks and sprinkler valves, and has dry primers and detonators removed from the vicinity of the fire.

3. The Navigation Officer relieves the Officer of the Deck.

4. The Engineer Officer stations an officer at the steam fire extinguisher manifold and at the chemical extinguishing valve if the fire is in a compartment so piped.

5. The First Lieutenant aids the Executive Officer.

6. The Medical Officer at the sick bay makes provision for removal of the sick and is prepared to receive injured or to dispatch a first aid party.

7. The Supply Officer assures himself that storeroom keys are supplied and makes preliminary plans for saving public money and records.

Special details.—The following special details under the command of the carpenter assemble well clear of the scene of the fire:

1. Repair crew with tools.
2. Fire extinguisher details.
3. Rescue breathing apparatus details.

General duties during fire.—

1. Connect and lead out hose to all fire plugs in vicinity of the fire. Divisions remote from the fire use their hose to extend other lines.

2. Put pumps on the fire main.

3. Serve out flood cock, magazine and storeroom keys.

4. Flood magazine and shell rooms if necessary.

5. Remove explosives, gasoline, oils and other inflammable material from the vicinity of the fire.

6. Close air ports, doors and hatches when necessary. Do not cut

off or close unnecessarily the passages and hatches used for access and for communication.

7. Men in charge of storerooms stand by them with keys.

8. Stop any blowers or close any valves in air ducts which supply air to the fire.

9. Be prepared to light up the vicinity of fire with portables, lanterns or electric bull's eyes.

10. If alongside a dock or other vessel, be prepared to cast off.

11. Remove sick or prisoners to a place of safety.

Fire at general quarters.—Fire is fought by the officer and men at the scene. As far as possible, the action of engaged guns must not be interrupted. Effort must be directed to prevent the spread of the flames, to remove spare ammunition to a safe distance, to direct chains of ammunition passers which are too close to the fire and to isolate endangered magazines, flooding them if necessary.

Collision drill.—*The calls.*

1. Emergency signals.
   a. General alarm.
   b. One long blast of the siren.
   c. The warning howlers.
   d. Word passed by the boatswain's mate as to the location of the injury.
   e. "Assembly" on the bugle.
2. Secure signals.
   a. Three blasts on the siren.
   b. "Secure" on the bugle.
   c. "Secure" by boatswain's mate.
   d. "Secure" over the interior communication system.

Officers' stations and duties.—Stations and duties for the collision drill are similar to those of the fire drill with adaptations as noted below:

1. The Executive Officer is in general charge.

2. The Navigating Officer informs himself of the course and the distance to the nearest shore. He is prepared to issue charts and navigating outfits and to relieve the Officer of the Deck.

3. The Engineer Officer sees that the pumps are started and are put on flooded compartments or on the drainage system. He keeps the Executive Officer informed as to the condition of all compartments within the limits of his department.

4. The First Lieutenant exercises supervision over the divers. He assures himself that the valves and arrangements outside the engineer's department permit the pumping of damaged compartments.

5. The Medical Officer's duties are similar to those of fire drill.

6. The Supply Officer's duties are similar to those of fire drill.

Collision at anchor.—Officer of the Deck is prepared to veer, to rig the booms and to clear the side. General duties during collisions at anchor are:

1. Close watertight doors and fall in at quarters.
2. Localize the flooding by closing valves and shoring bulkheads.
3. Prepare leak stoppers for use.
4. Rig and man diving outfit and prepare to get diver over the side.
5. Man lifeboats; prepare to lower all other boats; prepare to rescue or render assistance.
6. Prepare to release prisoners.
7. Prepare to remove sick.
8. At night man searchlights.
9. Pump out flooded compartment.
10. Prepare to take measures such as shifting oil and stores or flooding compartments to keep the ship on an even keel.

Detailed duties during collision drill.—Doors, hatches and valves are grouped and the various groups are assigned to squads. At drill it is important that every "dog" be secured and defects preventing efficient closing of doors, hatches or valves be reported to division officer at once. These defects shall immediately be remedied.

Escapes.—The collision bill indicates the escapes to the upper deck. Care is taken that no man is sealed in a compartment.

Collision or underwater damage at general quarters.—No emergency signal is made. The senior present in the endangered locality will localize the damage, using the men available and the repair crew.

Abandon ship drill.—*General requirements of the drill.*—The drill for abandon ship provides for:

1. Having all hands get and put on life jackets.
2. Getting boats and rafts out and embarking as quickly as possible, providing a life jacket for each man, and sea ladders or lines at points designated for embarking.
3. Getting out, manning, provisioning and equipping boats and rafts.

The ship's organization provides for:

1. Making two or more trips with boats.
2. Varying the capacity of each type of boat below maximum allowed, regulated by sea conditions.
3. Reduced number of boats available due to accident or other conditions.
4. Periodical inspection of life belts.

The calls.—

1. Emergency signals for abandon ship.
   a. General alarm.
   b. "Abandon ship" on the bugle, followed by "double time" on the bugle.
   c. The boatswain's pipe "all hands abandon ship."
2. Emergency signals for "provide and abandon ship."
   a. General alarm.
   b. "Provisions" on the bugle, followed by "abandon ship" on the bugle.
   c. The boatswain's pipe "all hands provide and equip for abandon ship."
3. Secure signals.
   a. "Secure" on the bugle.
   b. "Secure" by boatswain's mate.
   c. "Secure" over interior communication system.

Station and duties during abandon ship.—

1. The Executive Officer is in general charge.
2. The Gunnery Officer and the First Lieutenant take immediate charge of embarkation, each on one side of the ship.
3. The Navigation Officer relieves the Officer of the Deck, and is prepared to give the course and distance to land.
4. The Engineer Officer and his assistants repair to their station in engine and fire rooms. All petty officers of the engineer department take steaming stations; relieving as many of the non-rated men as possible.
5. The Medical Officer supervises the transportation of the sick and injured to first boats.
6. The Supply Officer saves the public money and accounts.
7. The ship's company is detailed to first crews and second crews.
8. Generally, the junior officers are detailed to the first crews; the seniors to the second crews. Of the men, the junior ratings are detailed

to the first crews. Each crew should have sufficiently experienced men of the seaman branch to insure proper handling of the boat.

9. Each man and officer is provided with a life jacket.
10. Second crews assemble clear of boats on bridges and superstructures.
11. First crews assemble adjacent to boats.
12. Deck petty officers of second crews shall assist in getting out boats for first crews.
13. Prisoners are released.
14. At proper time, notification is sent to officers and men below who secure boilers and machinery and join the second crews.
15. Reasonable provision is made to save the logs, records and muster rolls. Confidential books and papers must be saved or destroyed.
16. Depth charges are all put on "safe."

The boats are brought back by details from the first crews to take off the second crews and make other trips as required.

Fire and rescue drill.—*Purpose.*—The fire and rescue party is called upon to assist a vessel on fire, to prevent the spread of flames to shipping, to render assistance on shore or to rescue people from a vessel in distress. The entire equipment specified should always be provided. Boats should be commanded by regular boat officers.

The calls.—

1. Emergency signals.
   a. General alarm.
   b. "Assembly" on the bugle.
   c. The boatswain's pipe "away fire and rescue party."
2. Secure signals.
   a. "Secure" on the bugle.
   b. "Secure" by the boatswain's mate.
   c. "Secure" over interior communication system.

Organization.—The organization consists of three details: the rescue detail, the fire detail and the relief detail.

1. The rescue detail. Men are taken from division or divisions that man the specified boats. Each of these divisions has a complete organization in each watch and a medical officer with outfit. In addition to the regular equipment each boat will take:
   a. One life jacket for each officer and man in the boat.
   b. One ring life buoy fitted with hauling lines.
   c. One hand grapnel on a line.

In port, power boats should be used by the rescue detail if immediately available.

2. The fire detail. The boats designated are those which can be hoisted out quickly, are adequate, and have motive power. Each watch of the divisions from which the fire details are drawn should contain a complete fire detail, so that with men on liberty the organization can handle the emergency. The necessary artificers are similarly detailed. Each boat should carry its regular equipment except spars. The special equipment is provided by an adjacent division, leaving the fire details free to man their boats.

a. The first boat to go out should carry:
   (1) Boat officer and crew.
   (2) Artificer with unshackling kit.
   (3) Rescue breathing apparatus detail.
   (4) One life jacket for each officer and man in the boat.
   (5) One ring life buoy fitted with hauling line.
   (6) Two hand lanterns.
   (7) Two foam-type extinguishers.
   (8) Six buckets.
   (9) Fire-party chest, containing:
      (a) Two axes.
      (b) One crowbar.
      (c) Two grapnels fitted with chain and rope lanyards.
      (d) Two heaving lines.
      (e) Six bucket lanyards.
      (f) Two cold chisels.
      (g) Two ball-peen hammers.
      (h) One maul.
      (i) One Stillson wrench.

b. The second boat to go should carry:
   (1) Boat officer and crew.
   (2) Carpenter or mate.
   (3) Handy-billy pump crew.
   (4) One life jacket for each officer and man in the boat.
   (5) One ring life buoy fitted with hauling line.
   (6) Two hand lanterns.
   (7) One handy-billy pump.
   (8) Two lengths of suction hose with strainer.
   (9) Three lengths of fire hose.

(10) One nozzle.
(11) One spanner.
(12) One reducer.
(13) One jigger and two straps.
(14) One 5-inch line.

3. The relief detail. It is organized for each watch from a division or divisions not furnishing the rescue or fire details. It has 4 functions:

a. To relieve or to augment the fire and rescue details.
b. To be armed for shore duty to assist the local authorities in preserving order and protecting property.
c. To respond to the local fire regulations at a Navy yard.
d. To man additional boats for rescue duty.

Plane crash and salvage drill.—When planes are being launched or picked up, a ready boat is manned and ready for use. Motor lifeboats will normally be used.

Ready and salvage boat personnel.—Boat personnel shall be selected from men who are good swimmers. They are thoroughly instructed in regard to the general construction of the different types of aircraft, the manner in which a plane in the water should be approached and how to attach towing lines, grapnels or other gear to tow a plane. The personnel shall include: boat officer, medical officer or pharmacist's mate, signalman, diver and tender if shallow water diving apparatus is available, and regular boat's crew.

Boat's crews and ready parties stand by their boat on deck. Necessary steps are taken at intervals to insure the operation of engines.

Training.—All officers and men who are concerned with salvaging planes from the ready boat, with tending their towing, or with hoisting them aboard ship shall be thoroughly instructed concerning their possible duties. Bureau of Naval Personnel training courses and other available material should be utilized for this purpose.

Classification of accidents.—There are two classifications of plane accidents based on the condition of the crew and plane.

1. Forced landing, plane and personnel undamaged. This is the simplest form of accident which requires assistance from the ready boat. However, all possible speed must be used in rendering this assistance as a landplane will not remain above the surface of the water after landing for more than 3 or 4 minutes if its flotation equipment fails to function. On arrival alongside a plane under these

circumstances, the first concern is the safety of the personnel of the plane, the second is the salvaging of the plane. This latter requires the attaching of one end of a line to the plane and the passing of the other end to the ship which should be close aboard by the time this stage of the salvage operation is reached.

2. Forced landing, plane damaged and sinking, personnel submerged. In this case the salvage boats on arrival at the scene of the accident should make every effort to rescue personnel first. While doing so, a line should be attached to the plane as quickly as possible by grapnels or otherwise, so that the sinking of the plane will be retarded, thus giving more time to disengage any personnel that may be entangled in the wreckage or held in the plane. In case it is necessary for any member of the rescue boat's crew to go overboard in an effort to extricate personnel from a wrecked plane, he should always have a line attached to his body and be properly tended by a man in the boat. Men going overboard under these circumstances must be cautioned regarding the possibility of becoming entangled in the wreck should it suddenly sink.

CHAPTER 29

Battle Drills and Stations

The purpose of every Navy fighting ship is to find the enemy, and having found him, to bring him into battle. Recognition of this important fact serves to indicate how important the question of battle drills and a knowledge of duties of battle stations is for every bluejacket. The purpose of battle drills is simply to produce the maximum amount of efficiency and teamwork among all members of the crew no matter what their other duties may be. Just as a baseball team has practice to acquire knowledge and experience so as to be able to meet any situation, so must the crew of a fighting ship be drilled constantly, There is no shortcut to fighting efficiency. A ship never knows when, where or for how long it will have to be in battle. Two of the most dangerous times of day are at sunrise and sunset. It so happens that these are times when the physical efficiency of a human being is at a low ebb. To compensate for this, drill and discipline are absolutely necessary. An outline is given below containing the assignments to battle stations of the various officers and divisions aboard ship.

BATTLE STATIONS AND RELIEFS

Command.—

1. Captain. Station, conning tower; relief, Executive.

2. Executive. Station, secondary control station in direct communication with Captain.

Fire control.—

1. Chief Fire Control Officer. Gunnery Officer. Station, fire control tower.

2. Assistants.
   - a. Main battery.
     - (1) Spotters (1, 2, 3, 4, or 5).
     - (2) Plotting room officers.
     - (3) Turret officers.
   - b. Secondary battery.

      (1) Assistant Fire Control Officer. Station, secondary battery control forward.
      (2) Group control officers.
      (3) Battery officers.
   c. Antiaircraft battery.
      (1) AA Control Officer. Station, sky control.
      (2) Group control officers.
      (3) Battery officers.
   d. Torpedo battery. Torpedo Officer. Station, torpedo director.
   e. Ordnance repair crew. Gunner. Station as designated.
   f. Aircraft Division. Senior aviator.
3. Items to be covered in battle bill.
   a. Stations to be manned and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.
   b. Succession of reliefs for personnel at each station.
   c. For each condition of readiness, and for various conditions of action, the functions of all batteries and each station, including:
      (1) Succession of control stations and succession of methods of control for: single target, multiple targets on same side, and multiple targets on opposite sides.
      (2) Illumination procedure and control.
      (3) Ammunition supply.
      (4) Launching and employment of aircraft.
      (5) Procedure for casualties.

Ship control.—
1. Navigator. Station, primary ship control station.
2. Items to be covered in battle bill.
   a. Ship control stations and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.
   b. Succession of reliefs for personnel at each station.
   c. Successive steering stations; methods of steering.
   d. Battle lookouts; aircraft lookouts.
   e. Aloft conning stations, required not only to avoid torpedoes and mines, but also whenever any below deck steering station has control.
   f. Casualties and procedure.

Motive machinery and auxiliaries.—

1. Engineer Officer. Station, control engine room.
2. Items to be covered in battle bill.
    - a. List of stations and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.
    - b. Succession of reliefs for personnel at each station.
    - c. Casualties and procedure.
    - d. General damage control instructions for Engineering Department.

Damage control.—

1. First Lieutenant. Station, central station.
2. Items to be covered in battle bill.
    - a. List of stations and personnel thereat for each condition of readiness and each material condition, and procedure for passing from one condition to another.
    - b. Succession of reliefs for personnel at each station.
    - c. General damage control instructions.

Aid to wounded.—

1. Medical Officer. Station, primary dressing station.
2. Items to be covered in battle bill.
    - a. Primary and secondary dressing stations.
    - b. Stretchermen details.
    - c. General instructions.

Communication control.—

1. Communication Officer. Station, conning tower.
2. Items to be covered in battle bill.
    - a. Stations to be manned and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.
    - b. Succession of reliefs for personnel at each station.
    - c. Casualties and procedure.
    - d. Interior communication between various stations.
    - e. Exterior communications.
    - f. Radio direction finder plotting and tracking.
    - g. Coding and decoding boards for all conditions of readiness.

The battle exercises are not to be considered as periods of training so much as tests of training. The above groups receive their battle training independently.

The final preparations for battle are made when battle is imminent, when standing by in thick weather or before sunset. In daylight the call to general quarters is the signal for final preparations. At night the guns must be kept cleared and manned by the watch. The extent to which men off watch may turn in will depend on circumstances.

GENERAL QUARTERS

"General quarters" calls the ship's company to stations. Every officer and enlisted man must occupy his battle station at general quarters. Fleet working parties, ship work and boating must give way to general quarters routine. The general duties are the following:

1. Man battery and take battle stations.
2. Load torpedoes.
3. Connect fire hose.
4. Stand by manifolds and valves.
5. Stand by cut out switches and switchboards.
6. Test out all gear.

The calls.—

1. General quarters signals.
    a. General alarm.
    b. "General quarters" on the bugle.
    c. "General quarters" over interior communication system.
2. Secure signals.
    a. "Secure" on the bugle.
    b. "Secure" over the interior communication system.

Reports.—

The reports "Ready" and "Secure" call for operations listed below:

1. "Ready." To be called over fire control and interior communication systems.
    a. Gun divisions and fire control stations report to Chief Fire Control.
    b. Engineering stations report to Chief Engineer at engine control.
    c. Engine control, ship control, battle lookouts, communication stations, battle dressing stations, repair parties report to Damage Control Officer in central station.
    d. Chief Fire Control reports to Captain and Damage Control Officer.
    e. Damage Control Officer reports to Captain.
2. "Secure." Same as for "Ready."

The exercise.—Thorough preparation shall be made for every general quarters exercise, and a definite program shall be drawn up and followed at this drill, during which casualties shall be simulated.

The training of units of the battle organizations and gun crew should not be attempted at general quarters except to simulate casualties to personnel and material. Gun crews and other units are expected to be expert before the ship goes into action, and they should be brought to thorough proficiency before seriously taking up the problems of general quarters.

The action taken on each casualty shall be investigated. Casualties shall be given in such manner and at such time as to closely approximate a real casualty. The patrol and communication system of the ship must be used in all lower deck casualty drills to determine, first, that there is a casualty, second, that a prompt, accurate report to control is made, and third, that the proper action is taken to handle the casualty. Great thought and care are exercised to introduce all possible conditions existing with each casualty.

CHAPTER 30

Fire Fighting

Fire fighting and fire prevention in our Naval vessels is of vital importance. The story of the *Normandie* is well known. One of our largest ships was out of service for many months and millions of dollars of damage were caused by a fire started during refitting.

Fires are dangerous and destructive. The responsibility of preventing them lies in varying degrees with every Navy man. Good fire protection either ashore or afloat makes it possible to reduce the frequency of fires and to extinguish those actually kindled.

GOOD FIRE PROTECTION

There are three essential factors in good fire protection:

1. Strict fire prevention discipline.
2. Readiness of fire fighting equipment.
3. An understanding of fire fighting technique.

Fire prevention requires the elimination of conditions that cause fires or provide the material upon which fire feeds. A careless match or cigarette butt may cause a fire as damaging as one started by an enemy shell. The thoughtless act of throwing a switch or striking a spark with an unprotected tool in an atmosphere containing an explosive vapor would jeopardize the safety of a vessel. A wiping rag saturated with oil and carelessly discarded might cause a dangerous fire. These and many other avoidable hazards are the responsibility of the individual.

The collective responsibility of Navy personnel embraces a strict adherence to prescribed procedures and practices that are described aboard Naval vessels as "keeping things shipshape." These practices include such things as keeping containers of volatile liquids tightly closed, preventing the accumulation of oil and grease in the bilges or in the exhaust from galley hoods, keeping quarters and workshops free of waste material, properly stowing bedding, unseasonable clothing, inflammable liquids, paints, acids, gases and chemicals, and being careful of open lights and electrical equipment where an explosive vapor might exist.

Equipment readiness requires that all fire fighting equipment be maintained in a state of maximum efficiency. Standard equipment is described in the *Navy Fire Fighters' Manual.* All fire fighting equipment is distributed in readily accessible locations and inspected frequently to insure reliability and readiness for instant operation.

The technique of fire fighting requires an understanding of the types of fires and a knowledge of the proper use of equipment. Fire can be controlled more easily if its nature is understood.

Any combustible material will burn if it is heated to its ignition temperature and oxygen is present. If one of these conditions is removed, the fire goes out. So it might be said that the fire fighter's job is to cool the fire or to cut off the fire from its supply of oxygen. The combustible material involved in a fire is not always of one class but many fires are so much alike that a three-fold classification has come to be accepted quite generally. The nature of the combustion and hazards which may be present, in burning, determine the method of extinguishment for each type of fire.

TYPES OF FIRES

Class A fires are fires in ordinary combustible materials (such as bedding, clothing, wood, canvas, rope and paper) where the cooling effect of water is of first importance in extinguishment. The chief characteristic of Class A combustibles is the embers or ashes remaining after burning. Material of this type must be cooled throughout the entire mass before extinguishment is complete.

Class B fires are fires in inflammable liquids (such as gasoline, oils, grease, paint and turpentine) where a smothering or blanketing of the burning liquid is essential for extinguishment. Materials of this type burn at the surface where the vapors are given off and extinguishment is accomplished chiefly by smothering.

Class C fires are fires in electrical equipment where the use of a "non-conducting" extinguishing agent is of first importance. In most electrical fires it will be necessary to de-energize the circuits before any progress can be made. Carbon dioxide is a non-conductor of electricity and will not damage electrical equipment. Water fog would be the second choice in extinguishing an electrical fire.

Fire involving ammunition is extinguished with water. Sprinkler systems are installed in powder magazines and in all locations where powder is handled or passed in bags. Immersion tanks may also be provided.

Ordinarily, people are accustomed to think of starting a fire by bringing the fuel into contact with a flame or spark. But a fire can start in any combustible material whenever the substance is heated to its ignition temperature, provided oxygen is present. The ignition temperature of a substance is the lowest temperature at which it will ignite without the presence of a spark or a flame. This temperature may be brought about slowly, degree by degree, until the substance is ignited, as is the case when heat is generated by chemical action. When heat is generated by chemical action within the substance and the process continues until ignition takes place, the phenomenon is known as spontaneous combustion.

Because a fire can start by heat alone, combustible materials in the vicinity of a fire must be protected from heat transmitted through bulkheads and decks. It is as important for the fire fighter to protect combustible materials from heat as it is to protect the material from sparks or flame. For example, the deck below and above the fire and the surrounding bulkheads must be kept cooled and carefully watched.

PROVISION FOR FIGHTING FIRE ABOARD NAVAL VESSELS

The Navy fire fighter has at hand installed and portable equipment for extinguishing fires aboard Naval vessels. Water, steam, fog, foam and carbon dioxide equipment are provided.

The fire main aboard Naval vessels is a piping system that delivers water, pumped from the sea, to fire plugs and sprinkler systems. As an additional function the fire main supplies water for the flushing systems and cooling water for auxiliary machinery. Inasmuch as the fire main is vital in combating fires at sea, each seaman should have a working knowledge of its general plan and, in particular, the location of fire plugs and stop valves. Sprinkler systems are installed in magazines, turrets, turret handling rooms, pyrotechnic lockers and airplane hangar spaces. Water for these systems is taken from the fire main. A self-cleaning strainer, to remove incrustation and marine growth which accumulates and grows in the fire main (especially in tropical waters), is found attached to the fire plug. Periodic flushing of all fire plugs under full fire main pressure is required to blow out marine growth that may be forming in the fire main.

The Navy fire fighter should understand the ventilation systems aboard Naval vessels, for these systems consist of ducts of many sizes and provide means for spreading fire and smoke. The ventilation system either supplies fresh air to the various compartments or exhausts foul air and poisonous gases. It is the fire fighter's duty to see that ventilation ducts do not add to the danger aboard his vessel by closing or opening ventilation dampers or valves, stopping or starting blowers, as the Damage Control Officer may order. As a general rule, ventilation closures should be secured in the vicinity of any fire as the introduction of air will create drafts and increase the rate of burning.

The electrical equipment in a fire area is important. When orders are given, switches should be opened to cut off the current in a compartment or area exposed to fire. This is done for two reasons—to remove the danger of electric shock and to reduce the hazards of sparks from shorts in electrical circuits which might cause an explosion of combustible gases.

The drainage system aboard a Naval vessel is not a part of the fire fighting equipment, but its use may be necessary to preserve the safety of the ship. Water introduced into the ship reduces the stability and buoyancy of the vessel. The 1 inch outlet on the 2½ inch nozzle at standard fire main pressure introduces water into the ship at the rate of approximately 60 tons an hour. The fire fighter should remember that each gallon of water put into the ship during fire fighting operations has to be pumped out again. Generally, each compartment is connected to the drainage pumps by piping or is arranged to drain through sluice valves into other compartments that can be pumped out.

EXTINGUISHING AGENTS

In view of the two conditions necessary for any combustible material to burn (ignition temperature and oxygen) it can be said that if the source of fuel itself cannot be eliminated, the extinguishment can be accomplished only by cooling or smothering the fire or both. Materials used for extinguishing fires include water, foam, steam and carbon dioxide.

Water is the most common extinguishing agent used on a fire because it readily cools burning substances below their ignition temperature. The special Navy type all-purpose nozzle permits the application of water on the fire either as a solid stream or as water fog. The solid stream is effective against large fires in the open or against oil burning on the surface of water. As fog, water possesses its greatest heat absorbing ability. It dilutes combustible vapors, reduces temperatures and, as it turns to steam, extinguishes the fire. The screen of fog, produced at the nozzle, protects the fire fighter and enables him to approach the flame within an effective range. In extinguishing gasoline fires, foam should be used in addition to water fog. Since the volume of water delivered as fog is less than that of a solid stream, the ships pumping capacity is conserved and the amount of uncontrollable water introduced into the ship is reduced.

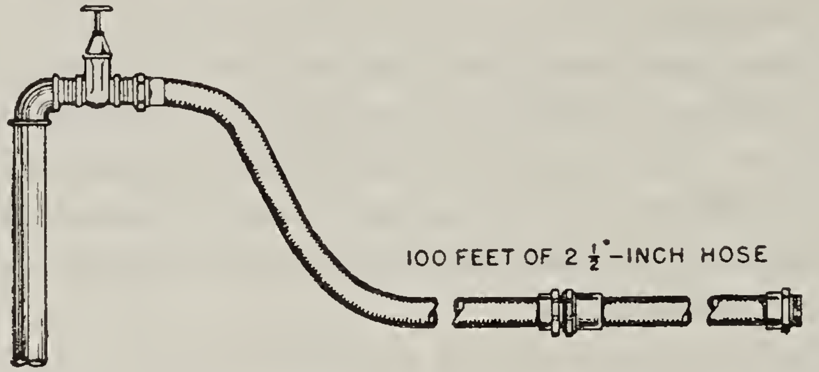


FIGURE 30-1.—Hose connected to fire plug.

FOAM is produced by mixing water with prepared chemical powder or liquid. Its effectiveness is based on the principle of excluding oxygen from the burning surface and its principal value is in blanketing oil and gasoline fires. It is most efficiently used when flowed gently onto the burning surface in sufficient quantities to quickly blanket the burning area. Water fog has little, if any, destructive effect on foam.

STEAM is an effective means of extinguishing oil and gasoline fires. Fires in carbonaceous materials (Class A fires) may be brought under control with steam but will smolder for several hours. Not until these materials are cooled with water below their ignition temperature will complete extinguishment be accomplished. Without such cooling, the smoldering fire will rekindle rapidly upon the introduction of air. Large quantities of steam are required and its effectiveness is limited to fires in confined spaces.

CARBON DIOXIDE is an inert gas which will not support combustion. When properly applied on a fire it dilutes the normal atmosphere to a point where the oxygen present is not sufficient to support combustion. Carbon dioxide is rapidly diffused by wind or drafts. The inert atmosphere created must be maintained over the

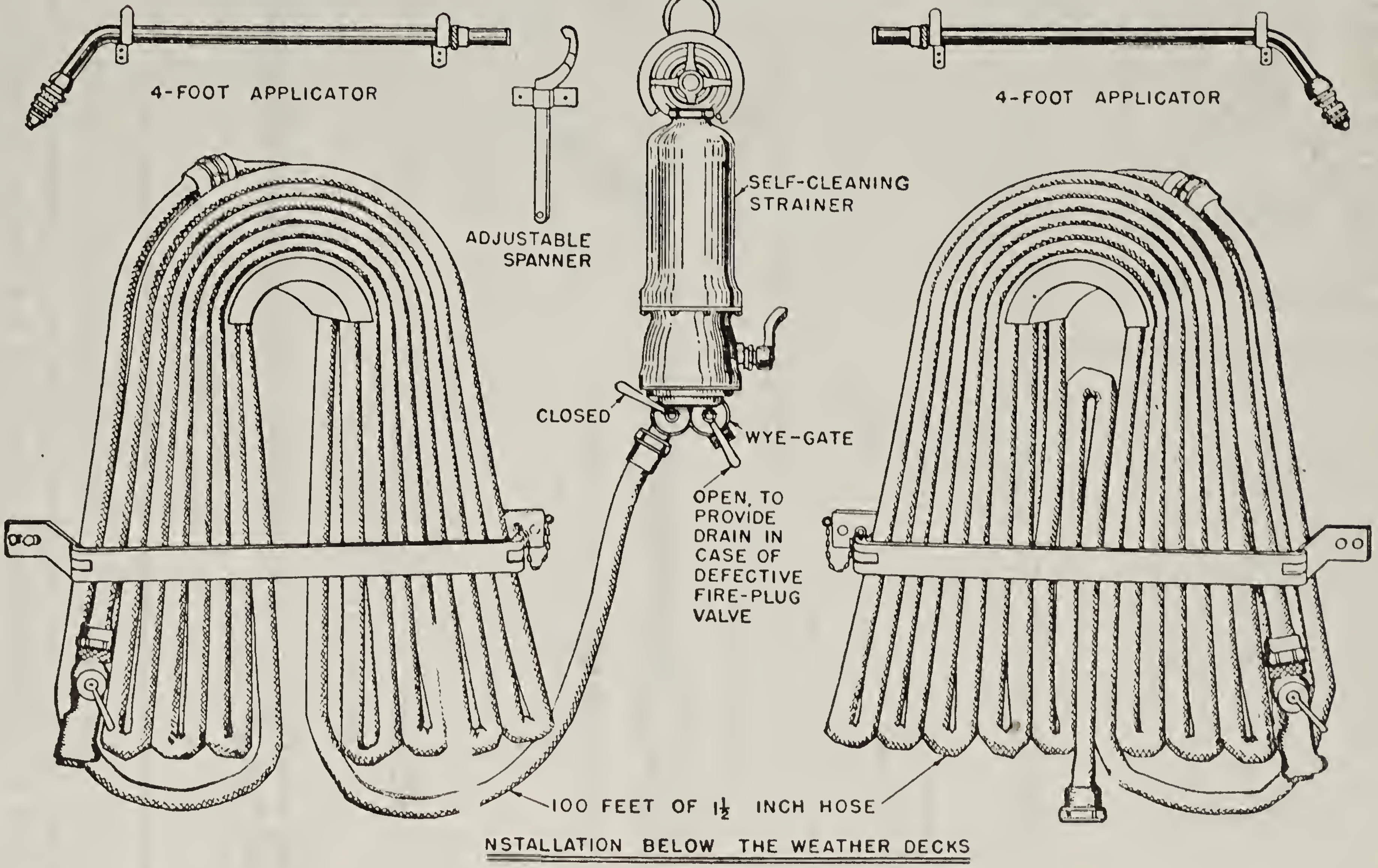


FIGURE 30-2.—Fire hose.

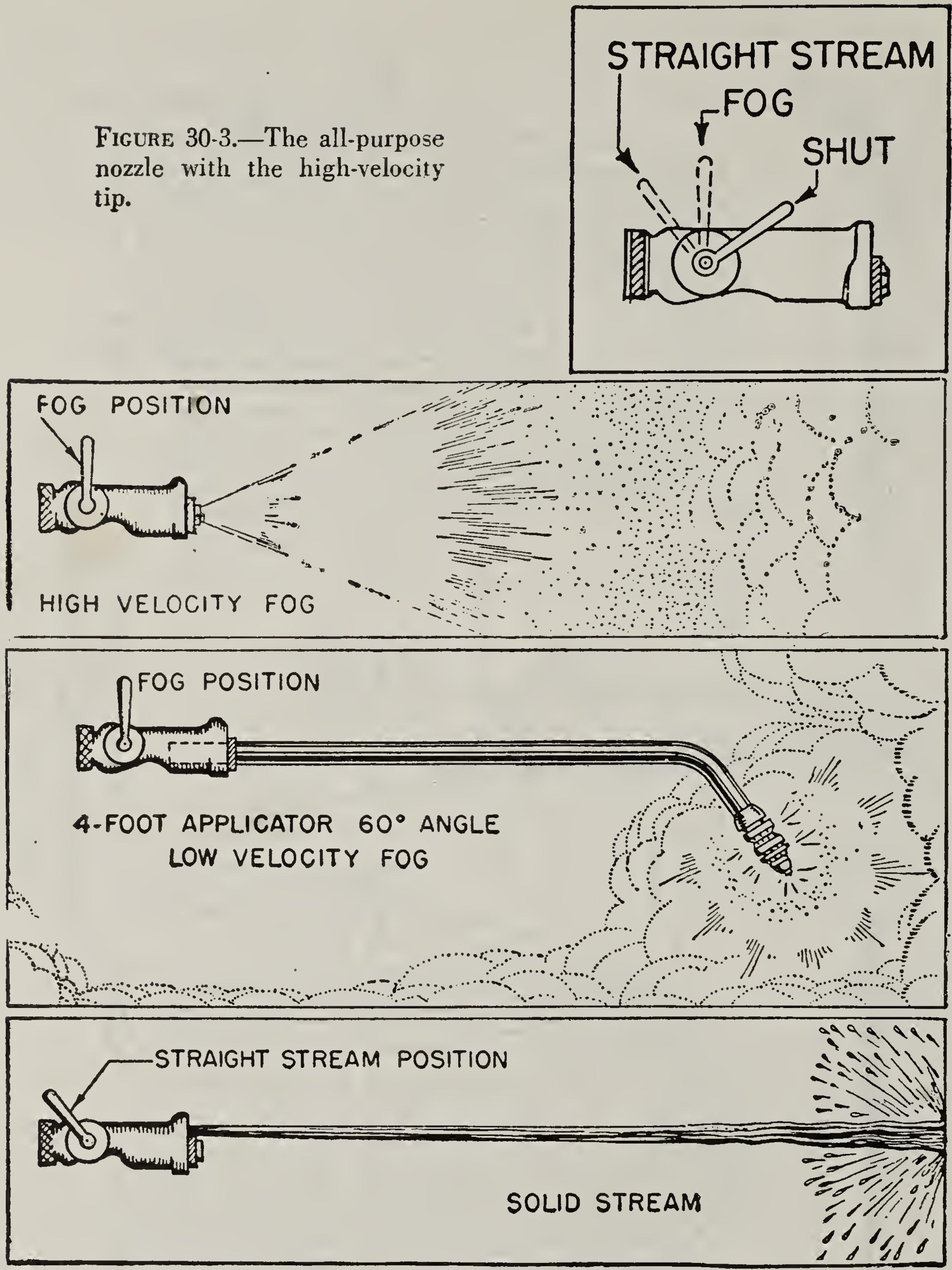


FIGURE 30-3.—The all-purpose nozzle with the high-velocity tip.

burning surface until the burning material has cooled below its ignition temperature to prevent reignition or flash-backs. Carbon dioxide is a non-corrosive gas and will not damage equipment or machinery. It is a nonconductor of electricity and is most effectively used on oil and electrical fires.

PORTABLE FIRE FIGHTING EQUIPMENT

All fire fighting equipment is distributed in readily accessible locations throughout the ship in accordance with the Damage Control Organization. Every seaman should acquaint himself with these locations.

Fire hose.—Two types of fire hose are found aboard Naval vessels—cotton, rubber lined hose, either 1½″ or 2½″ in diameter or unlined linen hose, 1½″ or 2½″ in diameter. The cotton, rubber lined hose is preferred. The hose comes in standard 50′ lengths with a coupling at each end. Fire hose is found faked on racks at the fire plugs, with an all-purpose nozzle, fog applicator and spanner wrench stowed on the bulkhead nearby. Hose stowed in the repair party locker is rolled into a coil. Inspection of hose and couplings should be made frequently to insure that threads fit easily, that the hose is not worn nor deteriorated, and that gaskets are in place. Ordinary paint and oil not only make fire hose stiff and difficult to handle, but the solvents have a tendency to affect the rubber lining.

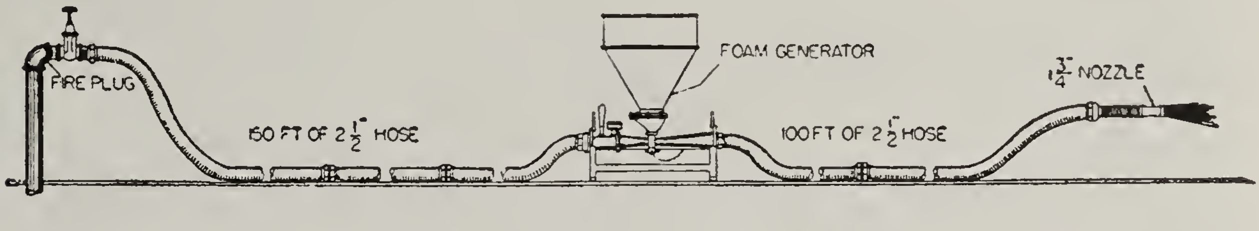


FIGURE 30-4.—A foam generator.

Fog nozzles.—The all-purpose nozzle can project either a solid stream or water fog. It is controlled by a single valve and can be completely shut off. A high-velocity fog tip snaps into place in the fog outlet of the nozzle. The high-velocity tip may be detached and replaced with an applicator equipped with a low-velocity head. Low-velocity fog is desirable in extinguishing some types of fire because of the higher water diffusion. The nozzles are supplied in the 1½″ and 2½″ sizes and will operate satisfactorily with a nozzle pressure of 60 pounds, but the higher the nozzle pressure, the more effective is the fog.

Foam.—There are two types of foam found aboard Naval vessels: chemical and mechanical. The difference lies in the method of making the two kinds of foam. In chemical foam, dry chemicals are placed in a so-called generator or hopper from which they are drawn into the water stream. The foam-making process begins as the in-

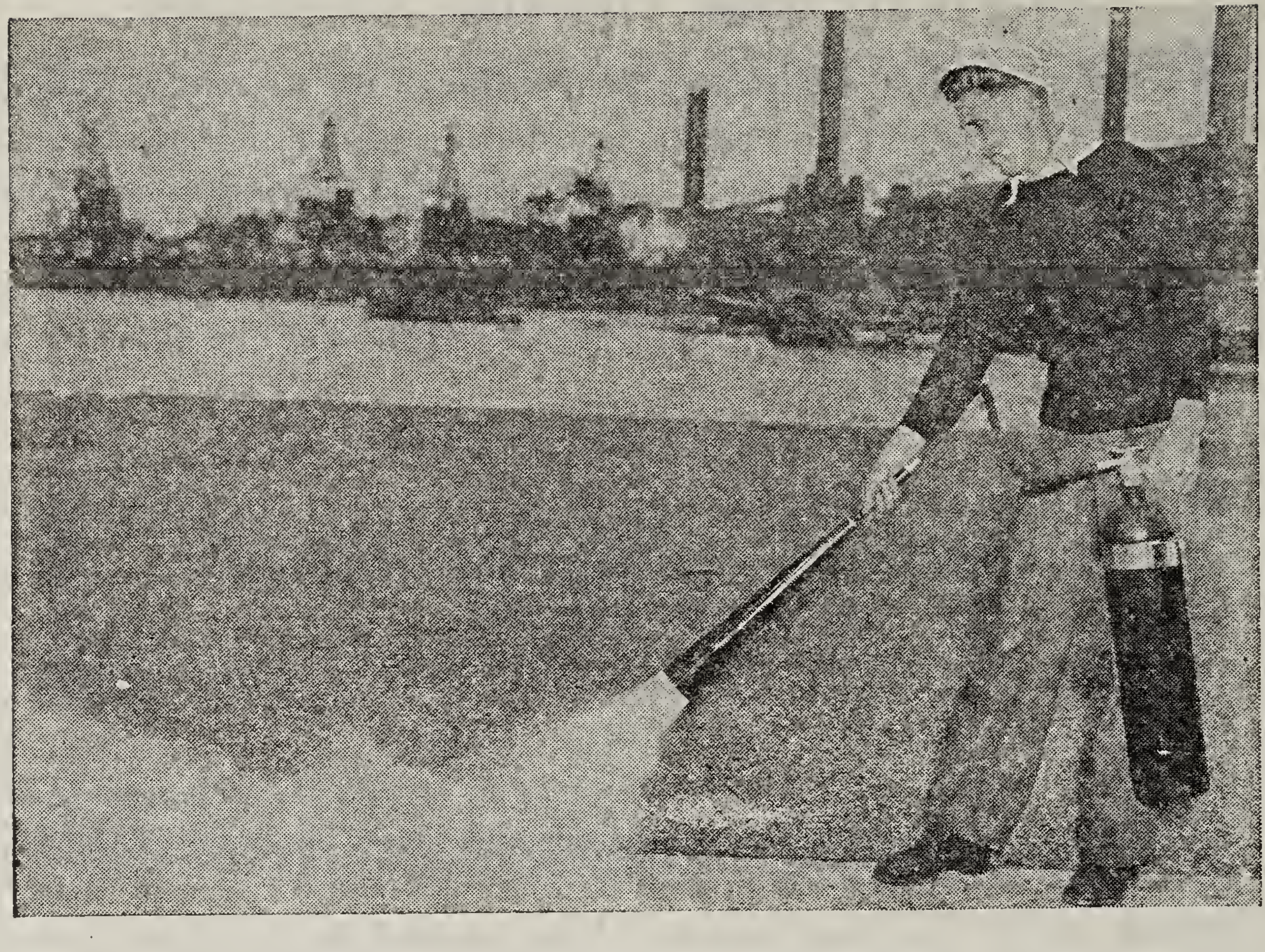


FIGURE 30-5.—A portable carbon dioxide extinguisher.

gredients leave the hopper and is completed as they are carried through the line of hose. The water and chemicals are thoroughly mixed in the hose to form a stout, lasting foam. The length of the hose, the size of the nozzle tip, and the temperature of the water all affect the quality of the chemical foam produced. For mechanical foam, a liquid foaming agent is introduced into the water stream. Foam is not generated until air is introduced into the water-foaming agent mixture in a special foam nozzle. Since the foam is produced at the nozzle, the length of hose does not have to be considered for the foam-making process, except as it affects the nozzle pressure. Mechanical foam has a firm texture, is free-flowing and retains its consistency for several hours.

Carbon dioxide.—Carbon dioxide extinguishers are steel cylinders designed to hold carbon dioxide under high pressure and release it through hose or piping when control valves are open. The 15-pound unit is the standard hand fire extinguisher aboard Naval vessels. In some locations, hose and reel installations, attached to two 50-pound storage cylinders, are provided, the hose being of sufficient length to reach all points of the area protected. A discharge nozzle is provided for direct application of the carbon dioxide gas on the fire. In some areas, total flooding systems are provided to protect special hazards.

The pressure in carbon dioxide cylinders builds up rapidly as the temperature rises. In boiler rooms where the temperature is higher, carbon dioxide cylinders are charged to only 90 per cent of the rated capacity.

The very qualities which make carbon dioxide a valuable fire extinguishing agent also make it dangerous to life. When it replaces oxygen in the area to the extent that combustion cannot be sustained, there is not sufficient oxygen present to sustain life. Prolonged exposure in air laden with a high concentration of carbon dioxide causes suffocation. The gas is colorless and odorless, and gives no evidence that can be recognized by the senses. It is heavier than air and remains close to the deck. With a portable extinguisher, however, there is practically no danger from carbon dioxide, as the amount of the gas discharged is not sufficient to dilute the atmosphere below that which will sustain life. The "snow" given off by the carbon dioxide extinguisher will blister the skin and cause painful burns if not removed. A Navy rescue breathing apparatus should be worn when entering a compartment where there is likely to be a harmful concentration of this gas.

Portable water pumps.—Portable pumping units, designed to deliver water at 100 pounds pressure, are available for fire fighting when the fire main has been ruptured. These units are light and can be carried to the scene of the fire. Suction can be taken from over the side or from the fire main to boost the pressure if necessary. The pump is also useful for pumping out flooded compartments after fire fighting operations are completed.

Portable oxyacetylene cutting equipment.—This equipment is used to cut holes in decks or bulkheads for the insertion of hose lines or fog nozzles, or to cut away wreckage which may be preventing fire fighting or rescue work.

Oxygen breathing apparatus.—A self-contained oxygen rescue breathing apparatus is provided to protect the wearer from breathing the gases or smoke in the surrounding atmosphere. Independence of the outside atmosphere is achieved by having the air within the apparatus continuously replenished with oxygen and freed of impurities. As a result, the wearer may safely enter a gas-filled compartment for fighting fire or rescue work. The particular features of this equipment should be understood by the men actually using it.

The Navy service gas mask is designed to protect the wearer against smoke. The canister does not generate oxygen but will filter for short periods of time smoke and many gases out of the air as it passes through the canister. The service gas mask should never be used in air containing less than 16 per cent of oxygen, or where carbon monoxide may be present.

Life line.—The steel life line is a 50′ length of 3/8″ woven steel wire, equipped at each end with a snap catch. The line is very pliable and will slide freely around obstructions. It is useful for hauling stricken persons to safety, or for lowering a rescue party to a compartment. This line is attached to a wearer of the rescue breathing apparatus, and is manned by a shipmate who stands ready to haul away at a signal or if he believes his charge is in trouble.

Asbestos suits.—Asbestos suits are furnished to provide personnel with flame protection, but are not intended to provide protection against or in severe fires. The length of time a suit can be worn depends upon conditions under which it is used. Complete clothing should be worn under the suit to provide additional body protection. The suit should be worn dry in any heat to avoid "steaming" of the wearer, unless continuous protection can be provided by fog nozzles or water stream.

FIRE FIGHTING

With an understanding of what fire is, how it spreads, and of the equipment and agents for extinguishing it, the Navy fire fighter is prepared to inquire into methods and techniques for the actual work of extinguishment. At the Navy Fire Fighters' School, he receives experience and training in actual fire fighting. It remains for him to apply this knowledge to the problems which would confront him in actions at sea. These problems will involve a great deal that is unpredictable, but his training will stand the fire fighter in good stead. Effective fire fighting is the application of a general knowledge of fire fighting to the particular problem which confronts Damage Control personnel at the time of action. The following fundamental rules should always be borne in mind:

1. The fire should be attacked as soon as possible with the extinguishing agent indicated by the type of burning material.
2. Bulkheads and decks of adjacent compartments should be kept cool and the fire prevented from spreading.

3. Fires in confined spaces may be brought under control by excluding air, thereby cutting off the supply of oxygen.
4. Ventilation systems should be secured to prevent the rapid spread of fire and smoke to other parts of the vessel.
5. Electrical equipment should be secured in an area which is suspected of containing explosive vapors.
6. Class "A" fires leave embers which are subject to reignition. This is especially true of fire brought under control with carbon dioxide or steam. Material of this type must be cooled throughout its mass with water before extinguishment is complete.
7. Self-contained oxygen breathing apparatus should be used by personnel if smoke and fumes make it necessary.
8. Water fog will act to shield the fire fighter from intense heat. When fighting a fire, an approach should be made in a crouching position, if possible from the windward side.
9. Foam is the best material to use in extinguishing large oil and gasoline fires.
10. In a smoke-filled compartment the best air for breathing will be found close to the deck.
11. All fires can be extinguished by trained personnel using the proper equipment.

CHAPTER 31

Chemical Warfare Defense

Good chemical warfare defense demands fearless action, best possible use of our protective equipment and prompt self-aid. Some men are afraid of gas because they know too little about it. In the last war it produced fewer than two deaths per hundred casualties, and is less to be feared than high explosive bombs.

Although gas should not be feared, nevertheless it must be respected because it can produce many casualties when used against men who do not know how to take care of themselves. If we are able to answer the following questions, we should have no fear of chemical warfare:

1. Do I know enough about my protective equipment and how to use it so as to prevent gas from reaching my body?
2. If contaminated, can I identify the type of chemical agent and treat myself with the proper self-aid?

METHODS OF LAUNCHING A GAS ATTACK

To understand the measures necessary for protection against chemical attacks, it is important to know that they may be launched either on land or sea in any one of the following ways:

1. From shells filled with chemical agents.
2. From aircraft, either chemical bomb or spray.
3. By releasing a chemical cloud from candles, cylinders, or from special apparatus designed for releasing gas.

DEFINITIONS

These definitions are necessary to understand the Chemical Warfare Reference Chart.

Agents.—A chemical agent is a substance which produces an effect on living organs or parts of the body, a screening smoke or a burning action.

Persistent agents.—A persistent agent is one which remains effective for a period greater than ten minutes. A good example is mustard gas, a blistering agent.

Non-persistent agents.—A non-persistent agent is one which loses its effectiveness in less than ten minutes. Phosgene, a choking gas, is an example of that.

Casualty agents.—The blister gases, choking gases, blood and nerve poisons come under this class.

Harassing agents.—These force the wearing of masks and thus slow up operations. The tear gases and vomiting gases are the common types.

Screening smokes.—These are substances used primarily for their smoke-producing property.

Incendiary agents.—Incendiary agents are chemicals capable of setting fire to or contaminating material and supplies.

Types of Chemical Agents.—

1. *Blister gases* are chemical agents which are readily absorbed or dissolved on the exterior and in the interior parts of the human body and produce pains, burns and blisters.
2. *Choking gases*, when breathed, cause inflammation and irritation of the nose, throat, windpipe and lungs.
3. *Blood and nerve poisons* directly affect the heart action and nerve reflexes or interfere with absorption and assimilation of oxygen by the body.
4. *Tear gases* cause a flow of tears with temporary pain, and also may irritate the skin.
5. *Vomiting gases*, when breathed in extremely low amount, cause coughing, sneezing, headache, pain in nose and about the teeth, followed by nausea and temporary physical weakness.

CHEMICAL WARFARE REFERENCE CHART

The accompanying chart contains a list of the principal chemical warfare agents. It also indicates for each agent the type, symbol, name, characteristic odor, color and state, persistence, protection necessary, effect on body and the self-aid required.

DETECTION OF GAS

Some kinds of gas are colorless while others are practically odorless so that it is necessary for gas sentries to be carefully trained

CHEMICAL WARFARE REFERENCE CHART

		Symbol	Name	Odor	Color and State	Persistence	Effect on Body	Protection	Self-Aid (Must Be Immediate)
CASUALTY GASES	BLISTER GASES	H	MUSTARD	Garlic Horseradish	Liquid slowly vaporizes	Open: 1 day. Woods: 1 wk. to all winter	No immediate symptoms. 3 to 36 hours later irritates eyes, skin, nose, lungs.	Gas mask. Protective clothing. Protective covers. Eye shields.	*EYES*. Wash out with water. *SKIN*. Blot off liquid. Rub in ointment S-461 or S-330. Do not use in eyes or on reddened skin. *CLOTHES*. See L.
		HN	NITROGEN MUSTARDS	Fishy or soaplike to practically odorless	Liquid slowly vaporizes	2 hours to days			
		L	LEWISITE	Geraniums	Liquid slowly vaporizes	Similar to H but less persistent	Immediate stinging pain of eyes and skin. Irritates nose, throat and lungs.		*EYES*. Squeeze ointment BAL into eyes. *SKIN*. Blot off liquid. Rub in ointment BAL. Do not use on reddened skin. *CLOTHES*. Remove clothing contaminated and discard. Avoid fumes. Treat underlying skin.
		ED	ETHYLDICHLORARSINE	Biting stinging	Liquid evaporates like water	1 to 12 hours			
		MD	METHYLDICHLORARSINE						
	CHOKING GASES	CG	PHOSGENE	Musty hay Green corn Ensilage	Colorless gas	10 minutes	Coughing. Choking. Difficulty in breathing. Fluid in lungs. Irritates eyes.	Gas Mask	Rest and comfortably warm.
		PS	CHLORPICRIN	Flypaper	Liquid	1 hour to 1 week			Rest and comfortably warm. Wash eyes, nose and throat for irritation.
	BLOOD AND NERVE POISONS	CC	CYANOGEN CHLORIDE	Biting	Colorless gas	1 to 10 minutes	Irritates eyes, nose, throat. Also as AC.	Gas Mask	Whiffs of amyl nitrite. First aid if not breathing is artificial respiration.
		AC	HYDROCYANIC ACID	Bitter almonds	Colorless gas	1 to 10 minutes	Dizziness. Headache. Coma.	Gas Mask	Same as CC.
		SA	ARSINE	Slight—like garlic	Colorless gas	1 to 10 minutes	Poisons blood and nerves.	Gas Mask	Rest and warmth.

HARASSING GASES	TEAR GASES	CNS	CHLORACETOPHENONE SOL	Flypaper	Cloud of particles. Droplets	1 hour to 1 week	Irritates eyes. Heavy concentration irritates nose, throat and lungs.	Gas mask	Wash out eyes with water and wash skin with soap and water.
		CNB	CHLORACETOPHENONE TRAINING SOL	Sweetish benzine odor					
		CN	CHLORACETOPHENONE	Apple Blossom	Clouds of small solid particles	10 minutes to 2 weeks			
		BBC	BROMBENZYL CYANIDE	Sour fruit	Liquid slowly vaporizes	Several days (weeks in winter)			
	VOMITING GAS	DM	ADAMSITE	No odor	Yellow	10 minutes	Vomiting. Irritates eyes, nose, throat. Headache.	Gas mask	Sniff chloroform. Keep masked. Lift mask only when actually vomiting.
SCREENING SMOKES		HC	HEXACHLORETHANE MIX	Sharp-acrid	White to grey smoke	While burning	Heavy concentration irritates eyes, nose throat. FS and FM liquid burn skin.	Mask in high concentration	Wash out eyes if irritating. Wash skin burns with water.
		FS	SULPHUR TRIOXIDE IN CHLORSULFONIC ACID	Acrid Choking	Dense white smoke	5 to 10 minutes			
		FM	TITANIUM TETRACHLORIDE	Acrid	White smoke	10 minutes			
		WP	WHITE PHOSPHORUS	No appreciable odor	Burns to white smoke in air	10 minutes	Burns skin.		Keep wet with water, or cover with copper sulfate. Remove particles. Do not use grease or salve.
INCENDIARIES		TH	THERMIT	Odorless	White-hot metal		Heat burns.		Treat as **ordinary** thermal burn. **Cool burning material and remove.**
			MAGNESIUM BOMB	Odorless	Burns with brilliant white light				
		IMNP	THICKENED GASOLINE	Burning oil	Black smoke reddish flames				

and very much on the alert. The following basic principles for identification of gas by odor may be found useful:

1. Do not smell deeply. Sniff.
2. Sniff only once. Repeated smelling dulls the sense of smell.
3. First smell, then think. The memory of odors can be trained by practice.
4. Learn odors of the agents by association with common odors. Every individual should make his own identification of the agents as odor perception varies with individuals and everyone will not describe a specific odor in the same way.
5. After each test, breathe out strongly through the nose several times. Do not smell a new sample until the old perception of odor has vanished.
6. Do not smoke while smelling. Smoking dulls the sense of smell.

Warning of a gas attack will in many cases be evident from the action of hostile air or surface craft. Any such craft which seems to be approaching a favorable position for launching a gas attack should be regarded with suspicion. The suspicion would be confirmed either by the visual appearance of the gas or by odor, or by both appearance and odor. However, do not rely solely on odors for the detection of gases, for the odors may be disguised or the gas may be odorless. When in doubt, give the alarm.

SELF-AID FOR CHEMICAL WARFARE AGENTS

On contamination by any gas, *self-aid,* or what you do for yourself, is most important. There is no time to wait for help from others before protecting or decontaminating yourself, since gas attacks the body in a matter of seconds. Self-aid is the responsibility of each man of all ranks.

Blister gases.—1. *Liquid mustard or nitrogen mustard in the eye.*—

a. Rinse eyes immediately with water from the canteen. Continue for from 30 seconds to two minutes.

b. Put on gas mask after decontaminating face with ointment S-461. Do not get S-461 in the eyes.

2. *Vapors of mustard or nitrogen mustards.*—

a. Washing of eyes and skin is of no value.

b. Put on gas mask.

3. *Liquid Lewisite and vapor in the eye.*—

a. Put ointment BAL into the eyes and on the lids.

b. Put on gas mask after decontaminating face with ointment BAL.

4. *Liquid mustard on the skin.*—

a. Blot, not rub, all visible liquid from exposed skin.

b. Apply ointment S-461 to contaminated areas. Rub in for 20 to 30 seconds. Wipe or wash off excess ointment. Repeat once.

c. Remove and dispose of contaminated clothes.

d. Decontaminate underlying skin with ointment S-461.

e. Wash with soap and water. Take a bath if possible.

f. After skin redness has developed, omit ointment, use only soap and water.

5. *Liquid Lewisite on the skin.*—

a. Ointment BAL should be substituted for S-461 in the procedure described for liquid mustard on the skin.

If a liquid chemical agent gets into the eye or on the skin but there is no immediate pain, assume that it is mustard. If, however, immediate severe pain, assume that it is Lewisite.

Choking gas.—

a. Hold breath until gas mask is on.

b. Carry on, unless breathing becomes difficult; then get medical aid.

Tear gas.—

a. Put on mask.

b. Wash eyes and skin with water if burning continues.

Vomiting gas.—

a. Put on mask and keep it on even though distress increases for several minutes.

b. Whiffs of chloroform relieve headache and pain in nose and throat.

Screening smokes.—

a. Keep burned part immersed in water or covered with a wet cloth until burning particles are removed.

b. Cover with copper sulfate solution when available.

c. Do not use oil or grease.

Blood nerve poisons.—

a. Hold breath until gas mask is on.

b. Sniff fumes from a crushed pearl of amyl nitrite.

c. Slip a crushed pearl of amyl nitrite under the mask of any shipmate who is unconscious or in convulsions. If he has stopped breathing, give him artificial respiration to make him inhale the nitrite fumes.

INDIVIDUAL PROTECTION AGAINST GAS

At the present time the individual is protected by the gas mask and by protective clothing.

The gas mask.—This is the most important article of equipment

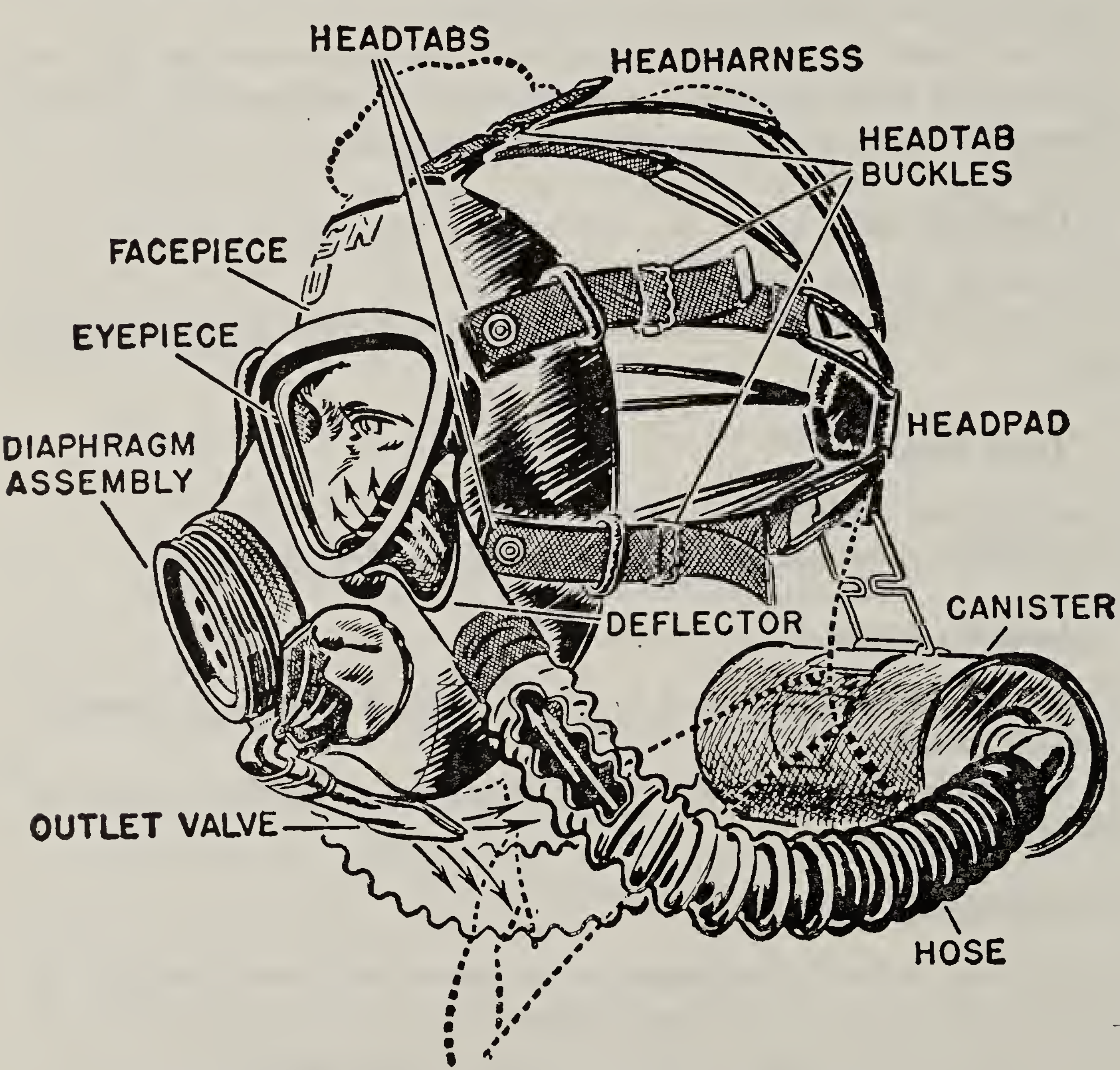


FIGURE 31-1.—Nomenclature of Mark IV Gas Mask.

furnished for individual protection. The Navy has, at the present time, six gas masks which are designated as follows: ND Mark I, ND Mark II, ND Mark III, ND Mark IV, NDO Mark I and the NC. The letters ND refer to Navy Diaphragm, and the letters NDO, to Navy Diaphragm Optical. The last mask mentioned, the NC, refers to the Navy Civilian which normally is issued only to shore establishments.

ND Mark I and ND Mark II.—Both the ND Mark I and the ND Mark II masks are old type masks which are being replaced as rapidly as possible. With these masks the canister is carried in a carrier which is strapped around the waist and over the shoulder of the wearer, the canister being connected to the facepiece of the mask by a single corrugated rubber breathing tube, 27 inches long. The facepieces of the ND Mark I and ND Mark II masks are made from molded rubber blanks, covered on the outside by a thin layer of cotton fabric, called stockingnette, which is vulcanized to the rubber. The eye pieces of the ND Mark I and the ND Mark II masks are made of safety glass. The lense of the Mark I mask is held in place by a crimped retainer, but the lense of the Mark II mask is held by a detachable screw-on type retaining ring so that the lense of this mask may be replaced readily.

ND Mark III and ND Mark IV.—The design of the ND Mark III and ND Mark IV is a radical departure from previous masks. The only difference between the Mark III and the Mark IV is the shape of the lenses. In this mask the facepiece is fully molded of rubber. The canister has been placed on the back of the head and is readily detached from the head pad of the head harness. The Mark III and IV masks are also of the universal facepiece type, and personnel may be outfitted as rapidly as a line can pass a given point.

The NDO Mark I mask.—The NDO Mark I mask is provided for personnel on board who must use optical instruments. It is similar in construction and design to the ND Mark III and IV, the only difference being in the type and shape of the eye pieces. The eye pieces on this mask are small and are made of plain glass. These are cross-connected by a screw fitting to permit their adjustment to suit the individual.

The antidim compound.—In order to prevent fogging of the lenses, an antidim compound is provided. A small cylindrical tin box, containing the antidim compound and a piece of cloth, is inside the carrier of all the Navy masks. When applied to the inner surface of the eye pieces and rubbed to a thin layer with the cloth, this compound forms a transparent film over the glass surface which aids in preventing them from becoming fogged.

Protective clothing.—The gas mask covers only the face. Consequently the protection which it affords from chemical warfare agents is limited to the eyes, lungs, and the face. Ordinary clothing affords little protection to the body against the penetration of the blister gases, either in the form of vapor or liquid. The special protective clothing necessary is known as impregnated or specially treated clothing. The suits are of two pieces, overalls and jumpers. Attached to the jumpers is a hood to cover such portions of the head and face as are not protected by the gas mask. The socks and woolen gloves worn with these suits are also chemically treated. Overshoes are worn, or the shoes are treated with Impregnite, a special impregnation preparation.

GAS MASK DRILL

The preliminary drill for all masks should be performed by the numbers in order to develop proficiency in proper adjustment of the mask. Proficiency in this drill should be followed by practice without the numbers to insure as quick an adjustment as possible and also to give practice in holding the breath. As a rule, careful adjustment is more essential than great speed.

In drill by numbers, especially when there are pauses between numbers for explanations and correction of errors, it is not necessary to hold the breath; holding the breath applies to drill without the numbers. This should become instinctive. All drills are to be given "at ease."

Drill for ND Mark III, IV, and NDO Mark I gas masks.—The steps to be taken in the drill are as follows:

1. *To sling the mask.*—With the carrier held in the palm of the left hand by the shoulder strap, flap of carrier facing away from body, the command is: (1) *Sling,* (2) *MASK.* With both hands, grasp top of shoulder strap forming a large open loop. Swing strap over head, at the same time passing left elbow through loop. Place strap at junction of neck and right shoulder. Straighten out strap if necessary.

2. *To unsling mask.*—With carrier slung, the command is: (1) *Unsling,* (2) *MASK.* With both hands grasp shoulder strap and raise

STEPS IN THE GAS MASK DRILL

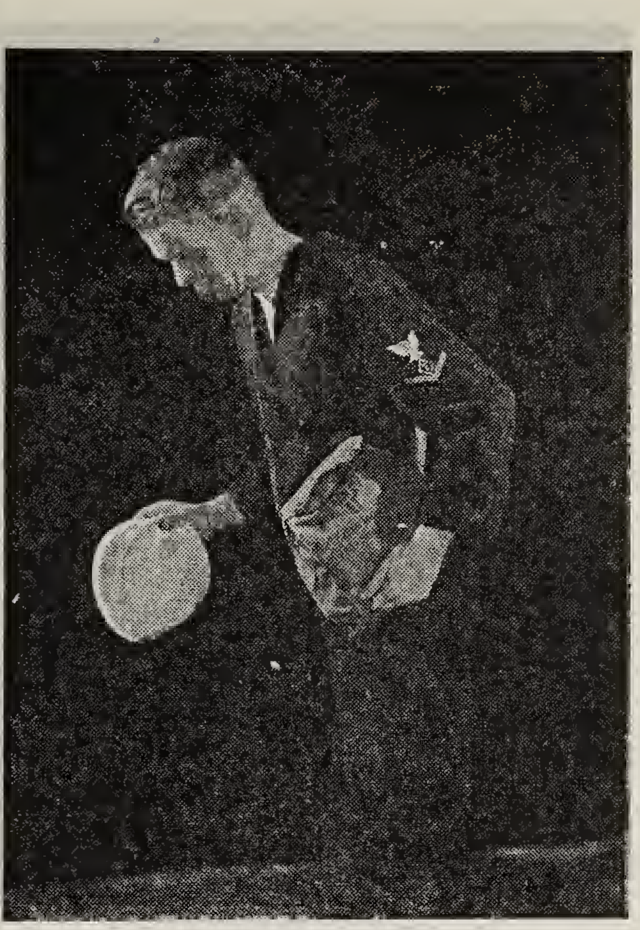


FIGURE 31-2

Remove headpiece. Do not let it touch the deck. If wearing helmet or other headpiece with chin or head strap, hang headpiece on your right arm.

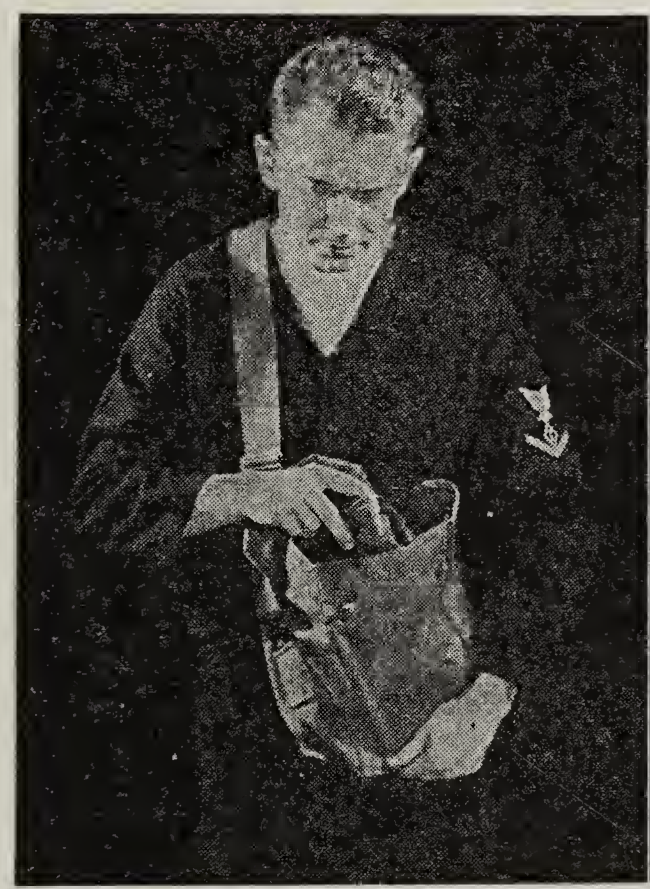


FIGURE 31-3

Hold carrier at bottom with left hand; open flaps with right hand. Remove mask with right hand by grasping diaphragm assembly.

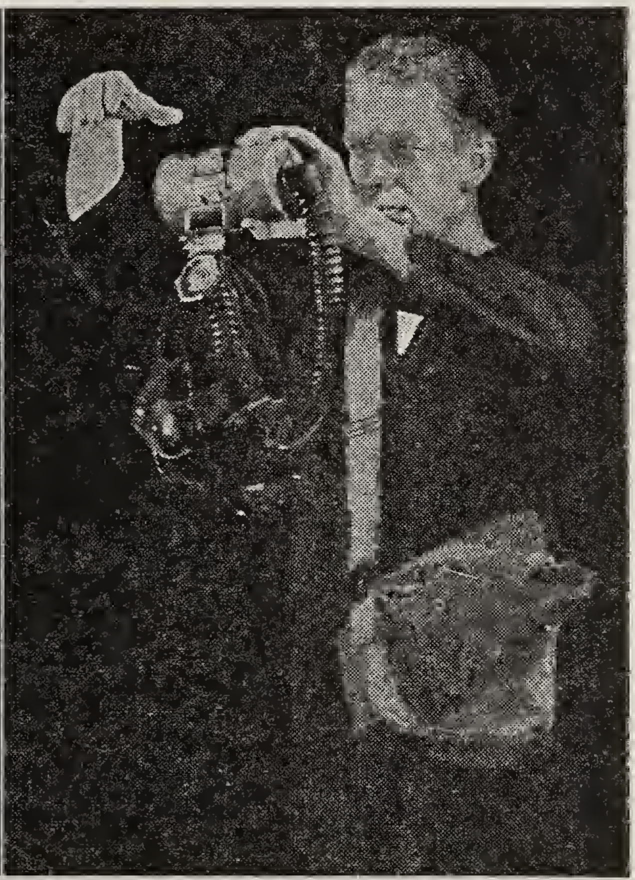


FIGURE 31-4

With the left hand, thumb underneath in an overhand grasp, hold the canister. Allow the facepiece to fall forward.

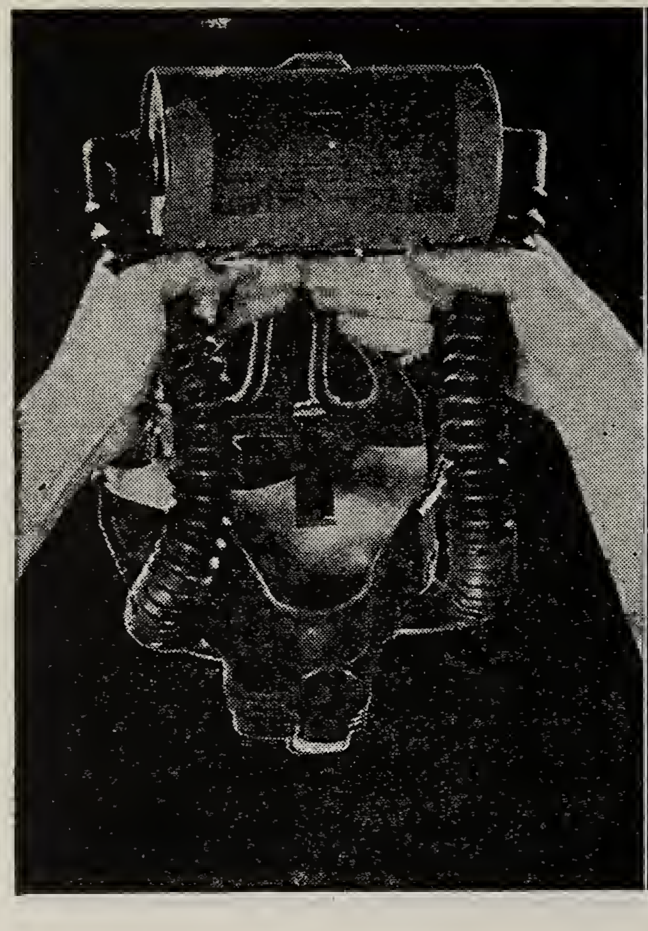


FIGURE 31-5

With thumb and index finger of the right hand, encircle hose close to the canister and lower head harness strap; same with left hand. Extend lower three fingers to raise head pad.

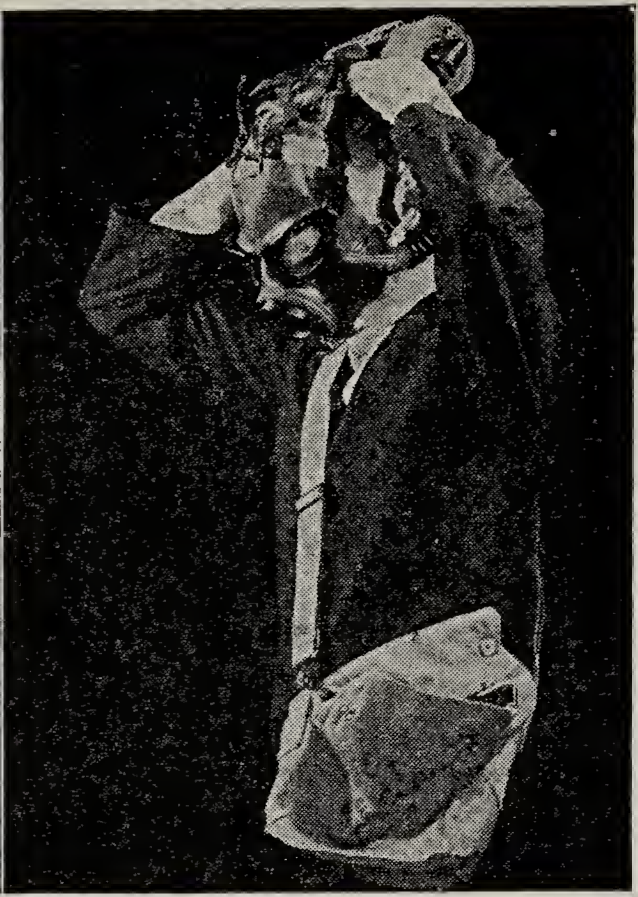


FIGURE 31-6

Seat facepiece firmly on chin and move canister and head harness into place with an upward, backward sweep of hands.

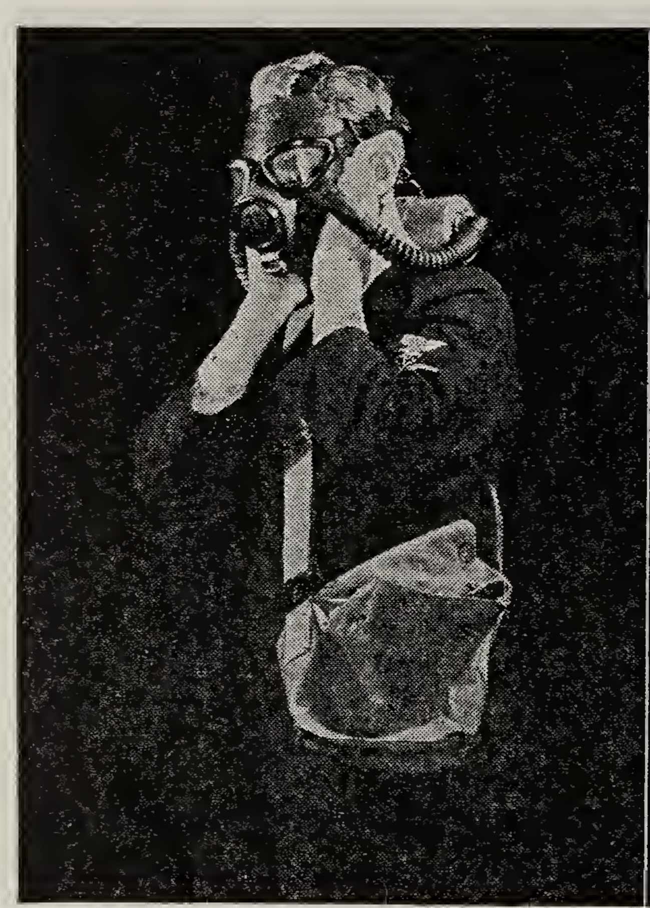


FIGURE 31-7

Canister pad should be at center back of head. Smooth out edges of facepiece from bottom to top.

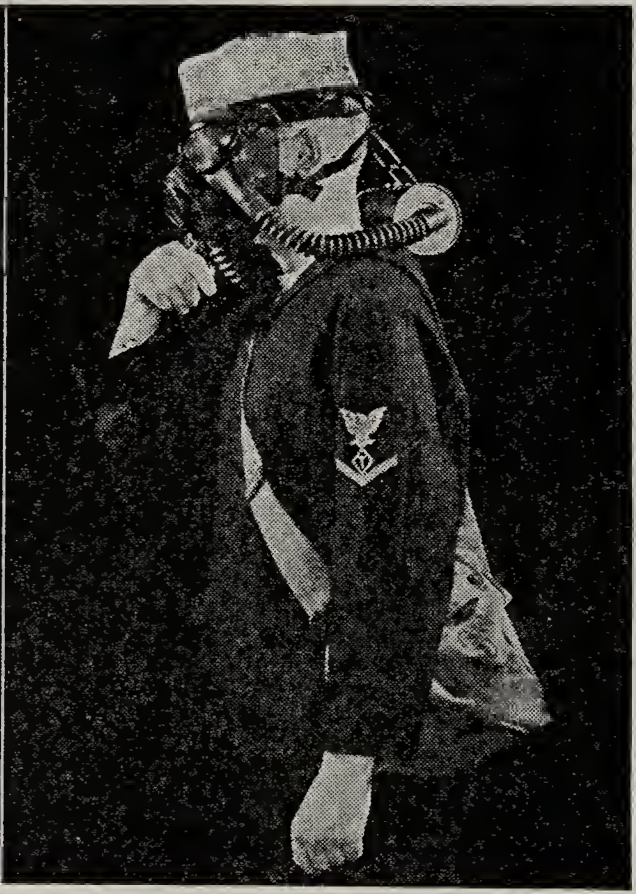


FIGURE 31-8

Close outlet valve with two fingers of the right hand. Exhale vigorously. This is known as "clearing the mask."

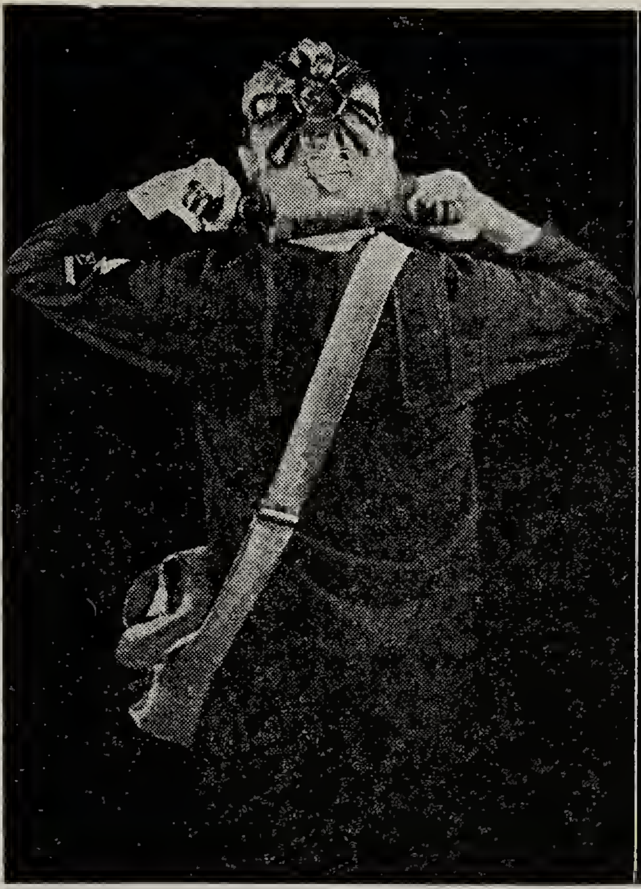


FIGURE 31-9

Check mask for fit by pinching both hoses close to canister to shut off air supply. Inhale. No air should enter and the facepiece should collapse.

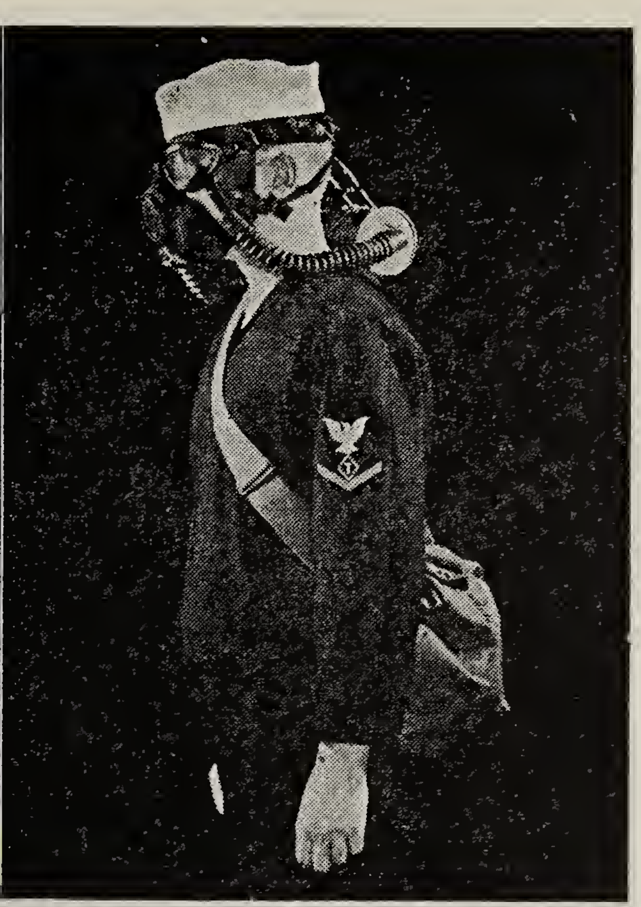


FIGURE 31-10

Replace headgear. Fold inner flaps of carrier and fasten the outside flap. Return carrier to position at rear of left hip.

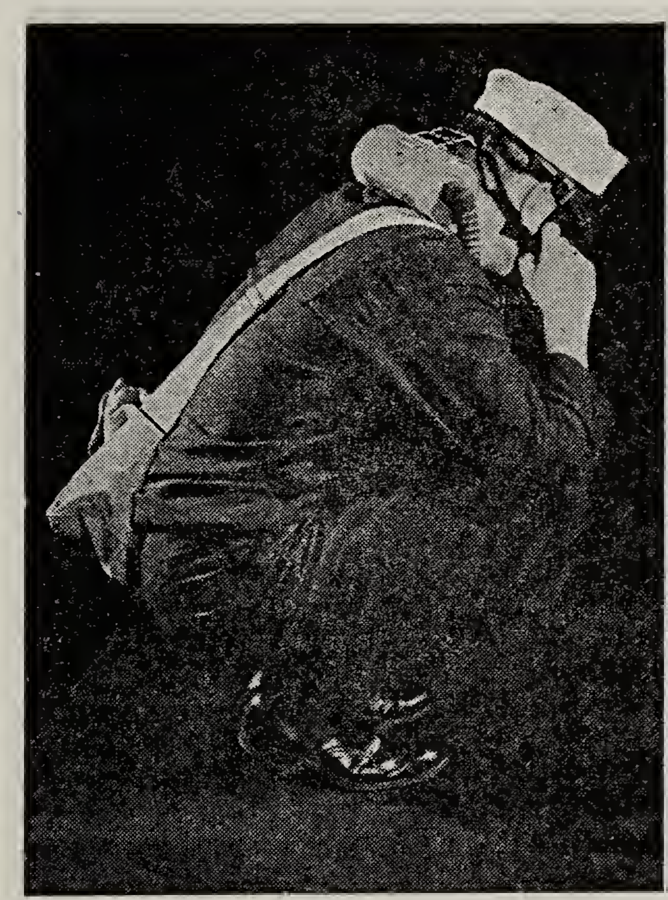


FIGURE 31-11

Test for gas before removing mask. Lower your head close to the deck. Pull facepiece slightly away from face by grasping lower head harness tab. Sniff gently. Resume erect position. "Clear the mask."

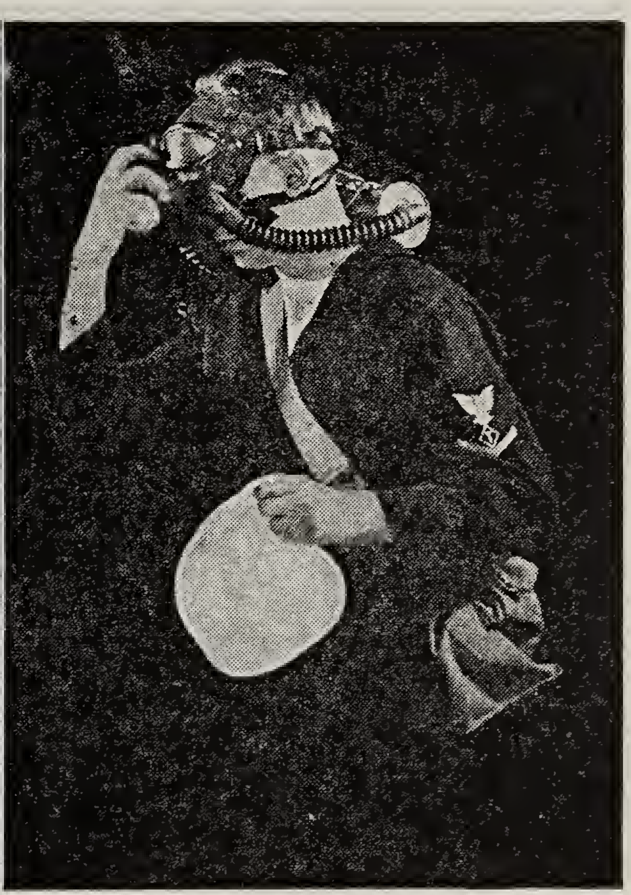


FIGURE 31-12

If no gas is detected, remove headpiece as in Figure 31-12. With the right hand grasp the diaphragm assembly. With a downward, outward, upward, backward motion, remove the mask.

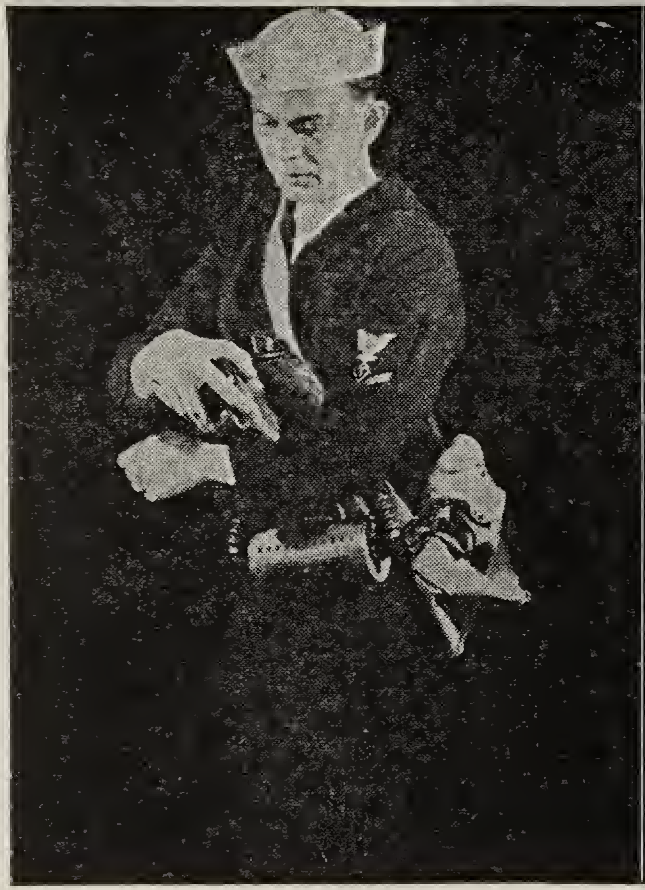


FIGURE 31-13

Hold mask in crook of left arm and replace helmet.

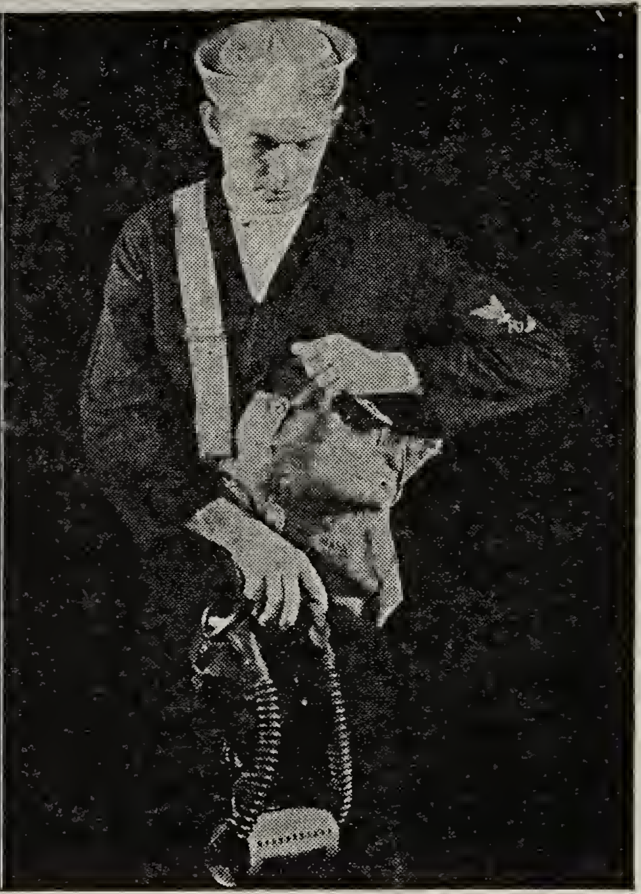


FIGURE 31-14

With right hand, which is holding mask, steady carrier; with left hand open carrier flaps.

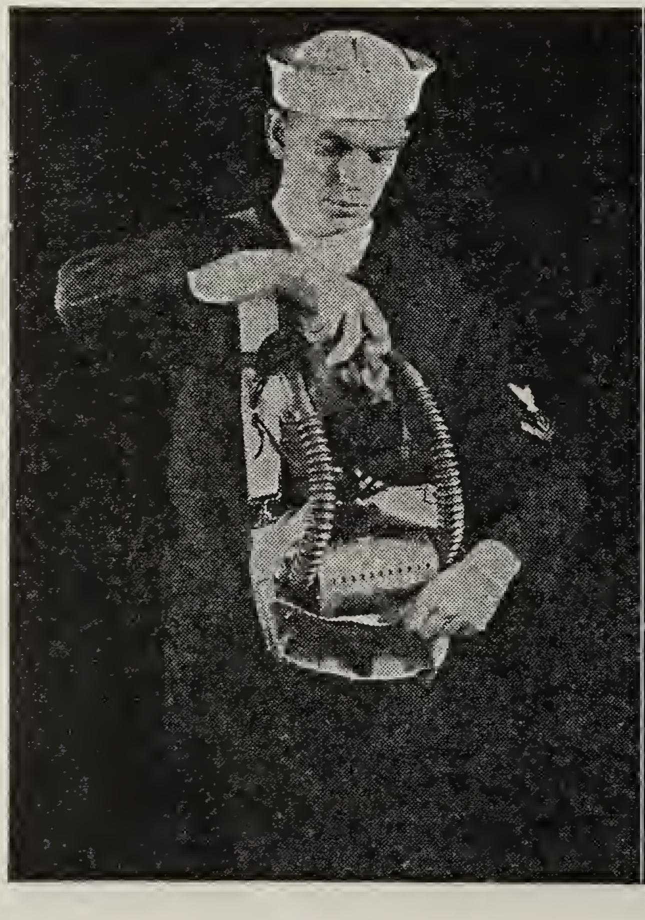


FIGURE 31-15

Start canister into carrier with outlet valve to the front away from the body.

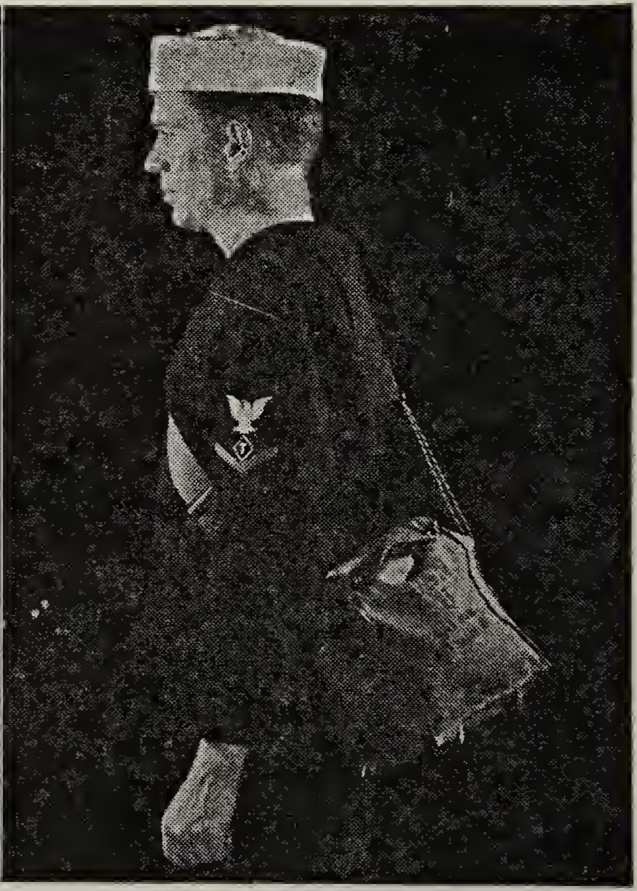


FIGURE 31-16

The diaphragm assembly should be parallel to the deck when properly seated in carrier. Fasten flaps; return carrier to rear of left hip.

and slide it over the head. Hold shoulder strap in left hand, flap of carrier away from body.

3. *To adjust mask.*—The mask being slung, the command is *GAS.* For drill by the numbers, the command is: *By the numbers, GAS.* At the command *GAS,* dispose of arms, etc. Remove and dispose of head cover. (Pass the head or chin strap or head covering over the right arm. Soft caps and head pieces without head or chin straps will be tucked in the waist between the carrier and the body or between the knees, using the right hand.) With the left hand, slide the carrier forward in front of the left hip. Hold it at the bottom with the left hand and open flaps with the right hand. Remove the mask by grasping diaphragm assembly and withdrawing up. Hold facepiece by diaphragm assembly with outlet valve to the front. With the left hand, thumb underneath, grasp the canister, and drop the facepiece forward, retaining grasp on canister. Grasp hose and lower head harness strap together on right side with right hand as close to canister as possible. Same on left side with left hand. Extend lower three fingers to raise canister pad, maintaining grasp on hose and lower head harness strap with thumb and index finger. Raise mask face high; thrust chin forward.

TWO: Seat facepiece firmly on chin and move canister and head harness into place with an upward, backward sweep of the hands. Seat head harness and canister pad; fit mask to face by smoothing out edges of the facepiece from bottom to top.

THREE: Close outlet valve with two fingers of left hand, or press the valve against the chin, exhaling vigorously. This is known as "clearing the mask." With the thumb and forefinger of each hand, pinch the walls of the hose tubes together between the canister and the facepiece connections as close to the canister as possible; inhale. The facepiece should collapse against the face and no air enter around the facepiece. If not, see paragraph "To Adjust Mask to Face."

FOUR: Replace head piece. Fold inner carrier flaps in and fasten the outside flap. Replace carrier in original position.

4. *To test for gas.*—The facepiece being adjusted, the command is: *TEST FOR GAS.* Taking a moderately full breath, exhale part of the air breathed. Stoop to bring the face as close to the ground as possible without touching any part of the person or equipment other than the feet to the ground. Grasp the lower head harness tab on the side of the mask and pull facepiece slightly away from the

face. Sniff gently but do not inhale. Resume the erect position. Clear the mask as previously prescribed. Resume normal breathing.

5. *To remove and replace mask.*—The facepiece being adjusted, the command is: (1) *Remove and Replace,* (2) *MASK.* For drills by the numbers, the command is: *by the numbers, remove and replace, MASK.* First, test for gas as previously prescribed. If no gas is detected, lift the head piece with the left hand and, with the right hand, grasp the diaphragm assembly. With a downward, outward, and upward motion, remove the facepiece. Return hat to head, retaining grasp of mask with the outlet valve toward body if the hat can be returned with one hand. (If not, hold the facepiece in crook of left arm and replace head piece using both hands. Regrasp mask by diaphragm assembly and bring to a position in front of the body, rotating it so that the outlet valve is to the front.)

TWO: With left hand, bring carrier to a position in front of the left hip. With the right hand, which is holding the mask, steady carrier against hip with left hand, open carrier flap and spread carrier open. Start canister in carrier with outlet valve away from the body.

THREE: Push canister to bottom of carrier with left hand. By shaking carrier with both hands, settle hose and facepiece into position in carrier. The diaphragm assembly and facepiece should be parallel to the deck. Refasten carrier.

To adjust the ND Mark III, IV, and NDO Mark I mask while wearing hood.—When protective clothing with hood is worn, at the command *MASK* with the hood back, adjust mask as described and clear and check mask. Using both hands, unfasten canister from head pad attachment and bring canister forward over head on to chest. Place hood over head, and return canister to back of head and fasten clasp over strap on hood. Reseat, recheck mask and button hood in place.

To adjust mask to face.—To adjust the head harness for a correct fit of facepiece, first loosen all six straps. Put facepiece on with straps loose and hold firmly against the chin with one hand. Center the head harness pad fairly well down on back of the head. Adjust the middle pair of straps, one at a time, by tightening evenly until the buckles lie flat. The ends of the straps should be about the same length. Adjust the top pair and then, in like manner, the bottom pair to the same tension as the middle pair of straps (check mask to test the fit). If the mask does not fit, the top pair may be drawn up a bit tighter after smoothing mask to the face from bottom to top, or if the individual has prominent hollows at the temples, the middle pair may need further adjustment.

If the facepiece allows air to enter at this time, two possible faults are indicated: first, if the leak is noticed between the edges of the facepiece and the face, faulty adjustment in fitting is probable. Such a fault may be overcome by pressing the edges of the facepiece to the face, readjusting head harness by carefully pulling up each of the opposing pairs of head harness straps a little at a time. A mask adjusted too tightly may cause a channel at the edge of the facepiece through which the gas may enter and headaches and discomfort on prolonged wearing may result. Second, if adjustment of the head harness fails to stop the leak, it is possible that a hole or rip in the hose, outlet valve, or facepiece may have developed and a minute visual inspection of the gas mask is necessary.

Outlet valves occasionally stick and cause exhaled air to pass out between the facepiece and the face, especially during very cold weather or after the mask has been disinfected. In case of a sticking outlet valve, remove the facepiece and open the valve ports with a match stick or the fingers, but be careful that the valve is not injured or torn in so doing. Talcum powder sprinkled on the inner surfaces of the outlet valve will prevent further sticking. Re-adjust the facepiece.

Mask inspection.—Checking the mask as described is not a conclusive test of its serviceability. During the execution of the drill when the mask is checked, if the facepiece fails to cling to the face and a leak is indicated, a minute visual inspection must be made. Visual inspections must also be made upon receipt of the mask, and periodically thereafter, for cleanliness and condition of the several parts of the gas mask. This inspection is made by the individual wearer. It is not executed as a precision drill but will be taught in the following manner:

To inspect mask.—The command is: (1) *Inspect,* (2) *MASK.* Remove facepiece and canister from the carrier and dispose of it either by hanging it over left shoulder or the left arm. Examine the inside of the carrier for torn straps, missing antidim, torn seams, etc. Examine the outside of the carrier to see that the straps, slides, and snap fasteners are complete and the carrier body clean and in serviceable condition. Examine canister. (See Note 1.) Examine hose. (See Note 2.) Minutely and carefully examine the eye pieces, outlet valve, facepiece, diaphragm assembly and head harness. (See Notes 3, 4, 5, and 6.) Persons with defective or faulty masks will report the defects.

Notes on Inspection.—1. Serious defects in the canister are indicated by holes through the canister body, excessive rust and corrosion, and by loose or rattling contents. (Normally, the canister does not make any sound when shaken.) Rust or corrosion may be caused by water in interior of canister, resulting in caked or damaged chemicals. This will lower the chemical efficiency and cause marked increase in breathing resistance. Such a canister will be exchanged. Minor defects in a canister are faulty inlet valves and loose connections to the hose. These can be repaired in the organization.

2. Hose may develop holes, splits and tears due to accidents. These may be temporarily patched in an emergency but should be replaced as soon as possible. Improper storage and incorrect placement of the hose in the carrier often cause kinks, undue stretching or tackiness, and permanent set of rubber. Such hose should be replaced.

3. If incorrectly stored, the rubber of the outlet valve may become sticky or tacky and later hard and cracked with a permanent set. Defective valves will be replaced. Occasionally after disinfection, and also during freezing weather, the edges of the valve discs will freeze or stick, causing very high resistance to exhalation. When this happens, it is necessary to examine the valve and carefully open the ports.

4. Check the diaphragm to see that it has no holes and that the mount forms a gas-tight seal.

5. Facepieces are affected by improper storage and careless use. The rubber may, unless correctly placed in the carrier, take a permanent set and form leakage channels around the edges. Head harness attachments may become torn or loosened. Cracks and splits sometimes develop near the eye pieces. Eye lenses sometimes are badly scratched. Unless the damage is too great, facepieces usually can be repaired within the organization.

6. If head harness is adjusted too tight or with too great tension during drills and wearing exercises, the rubber threads of the elastic straps may break. Improper storage may cause the rubber threads to deteriorate and lose elasticity. A defective head harness should be replaced.

Care and disinfection of the gas mask.—*Care.*—The gas mask is the chief piece of protective equipment, and it removes all of the chemical agents from any inhaled air, thereby protecting the eyes, face, and lungs from the effects of these agents. When masks are issued they are given to individuals and, therefore, the individual becomes responsible for care and operation of his own mask. He should inspect it frequently and keep it in good working order at all times so he may call upon it at any time without previous warning. In order that this may be done a certain set of rules has been established. They are:

1. Keep only authorized equipment in a gas mask carrier.
2. When not wearing the gas mask, keep it in a cool, dry place, out of direct sunlight.
3. Dry mask after use.
4. Inspect mask frequently.
5. Keep outlet valve clean.
6. Avoid contact of rubber parts with gasoline or oil.
7. Do not let any water enter the canister.
8. Do not lie or sit on gas mask.

Disinfection.—The gas mask is disinfected chiefly for sanitary reasons.

The Navy has available on its supply table an approved disinfectant for gas masks. This is issued by the Bureau of Medicine and Surgery as Stock No. S1-4790—10% concentrate.

It is also issued by the Bureau of Ships as Stock No. 51-D-394-78.

The disinfectant is known as "Zephiran." It is an effective germicide and fungicide and is used in units of 5 gallons, 1 gallon and ½ gallon. Smaller issues are also available in ounces. Directions for use come with each unit. One of its main advantages is that it allows use of the mask within 30 minutes.

In general, directions for Zephiran are as follows:

1. Add 1 part of Zephiran to 100 parts of water.
2. In disinfecting a gas mask the facepiece should be kept lower than the canister or hose to prevent the disinfectant from running into them. Hold the facepiece in the hand, saturate a small piece of clean rag with the disinfectant, and sponge the entire surface of the facepiece, including the outer and inner sides of the deflector. In this operation the facepiece should not be turned inside out. Then apply the disinfectant similarly to the outside of the outlet valve.
3. Squeeze a few drops of the disinfectant from the rag into the

exit passage of the angletube. Press the sides of the outlet valve with the thumb and finger to let the disinfectant run out. Do not shake off the excess.

4. Allow all disinfected parts to remain moist for about 15 minutes and then wipe out the inside of the facepiece with a clean, dry rag. The mask should dry thoroughly in the air (usually 30 minutes) before it is returned to the carrier.

Other disinfectants, such as alcohol, cresol and lysol, Dakin's solution, hydrogen peroxide, copper sulfate and others, have been used at times. There are objections to each however. Either they have a low antiseptic value, persist for a long time necessitating many hours for airing, or ventilation, irritate the skin or destroy parts of the mask.

COLLECTIVE PROTECTION AGAINST CHEMICAL WARFARE

Protection during action.—During action the main point to be considered is the prevention of the spread of the gases throughout the vessel. This is accomplished by the following steps:

1. Shut down all ventilation systems not ventilating the fighting spaces of the ship, and close all dampers and all watertight covers provided for the terminals of such systems.
2. Close and keep sealed all compartments not required to be entered in action.
3. Close all doors, hatches and manholes and keep them closed at all times except when absolutely necessary to pass through, and then test for gas before opening a compartment.
4. At the first sound of a gas alarm shut down the ventilation system and close the vent terminals with the watertight covers already provided—except engine rooms and fire rooms.

Closed spaces such as central stations, plotting rooms, etc., are now being fitted with air coolers and collective protectors or purifiers, so that these spaces can be made completely airtight against both persistent and nonpersistent gases and toxic smokes.

Decontamination.—Cleaning up a ship after a gas attack is very important and may offer considerable difficulty. Nonpersistent gases will normally be quickly carried off into the atmosphere, but the persistent agents may soak into surrounding areas and remain a source of danger for an extended period unless properly neutralized.

In case the ship's ventilation system has not been effectively shut down prior to a gas attack the problem becomes more difficult, for any gas that reaches an intake will rapidly be spread throughout the system and even a nonpersistent gas will remain in an enclosed compartment. Until a ship is cleared of all contamination, it is dangerous and may be fatal to occupy all or certain parts of it.

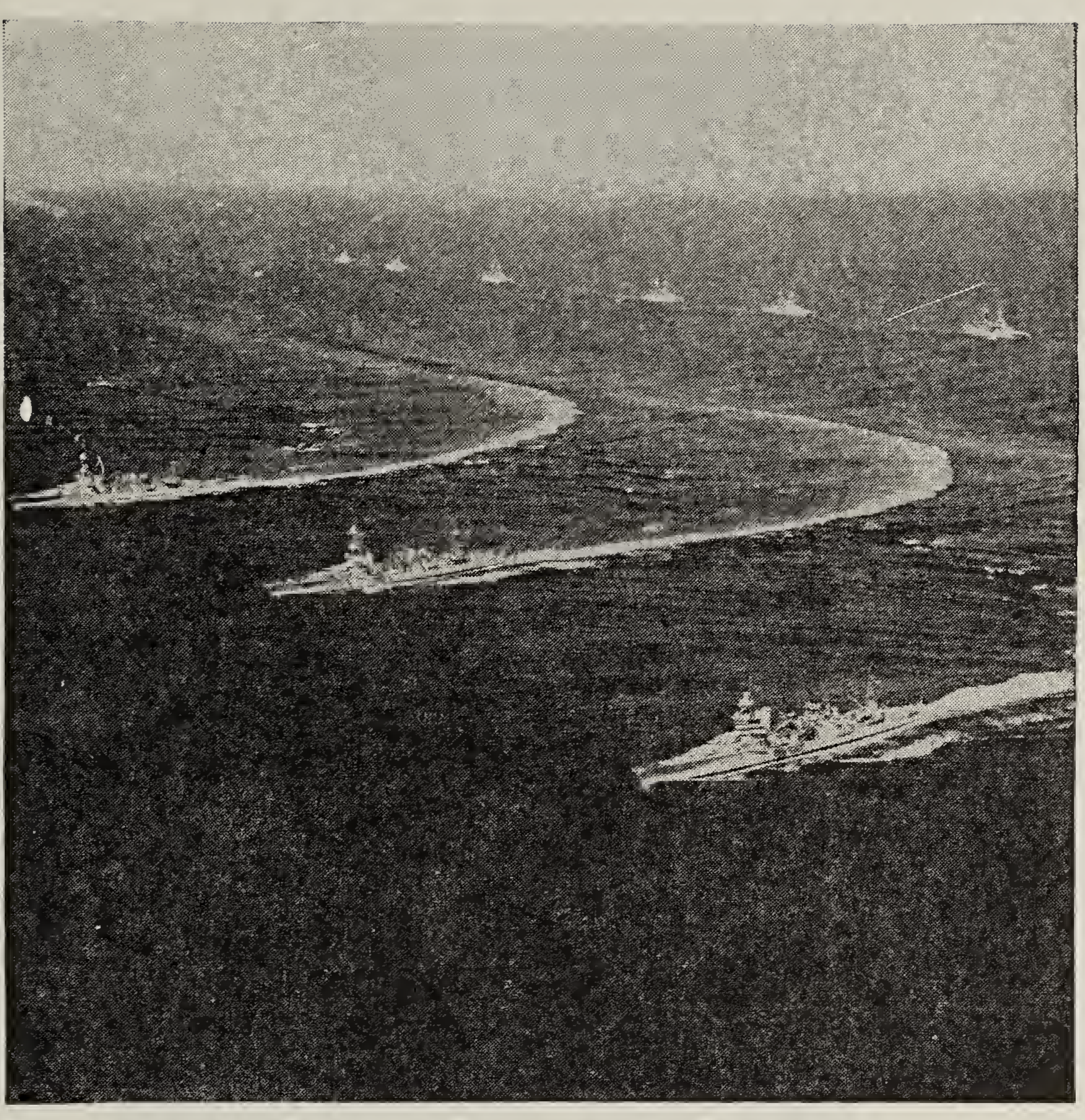
Nonpersistent agents on an open deck will be carried away quickly by the wind or will spread into the atmosphere and offer no particular problem. Nonpersistent agents which reach closed or semiclosed compartments can best be disposed of by ventilation; the ship's regular ventilation system is used, helped by portable blowers if necessary.

Persistent agents offer a problem either in closed compartments or on an open deck. Mustard and Lewisite when scattered on the decks and upper works of a ship slowly give off toxic fumes. Moreover the blister action makes walking across the decks or handling exposed gear extremely dangerous until they have been completely neutralized. If not cleaned up these agents will persist for from several days to months. Other persistent agents will persist for lesser periods of time. These agents quickly (within two to three minutes) penetrate wooden decks, paint, concrete and seams in metal, and when this occurs it is next to impossible to remove them without removing the decks and concrete. Efforts should, therefore, be made immediately to remove as much of the agent as possible.

If exposed areas are steamed or scrubbed, Lewisite will combine with either water or steam, but the resulting solid compound is still a toxic agent although less powerful than the original Lewisite. Mustard is not readily combined with water. For use aboard ship there has been developed a special decontaminating material, DANC, with which all hands should be familiar. Protective ointment may be used for the emergency decontamination of individual equipment.

Decontamination squads.—Clean-up squads should be organized from regularly instructed personnel, preferably from the deck and engineer-repair parties. Equipment for these squads consists of the gas mask, one suit of flashproof impregnated clothing, gloves and overshoes. It may be necessary to have squads work in relief, since cleaning must be done as quickly as possible to prevent further contamination of a ship, and work in impregnated clothing is very fatiguing.

Members of clean-up squads should be able to detect the standard chemical warfare agents by their odors, know the gas mask and its limitations, and understand the proper procedure for removing contaminated clothing after working in a toxic atmosphere. Further, they should know the various chemicals used to destroy chemical warfare agents and the proper methods of preparing and using them. They should know the ventilating compartments and the ventilation of a ship, and be careful not to contaminate other departments.



PART 7

HANDLING OF SHIPS UNDERWAY

CHAPTER 32

Steering and Sounding

THE RUDDER

Ships are steered by means of a rudder located amidships aft. When the rudder is moved to left or right the flow of the water against it forces the stern of the ship in the opposite direction. This swings the bow, causing the ship to turn.

The faster the flow of the water caused by the movement of the ship, the greater the pressure on the rudder; thus the steering effect is greater. At high speed, more power is needed to turn the rudder.

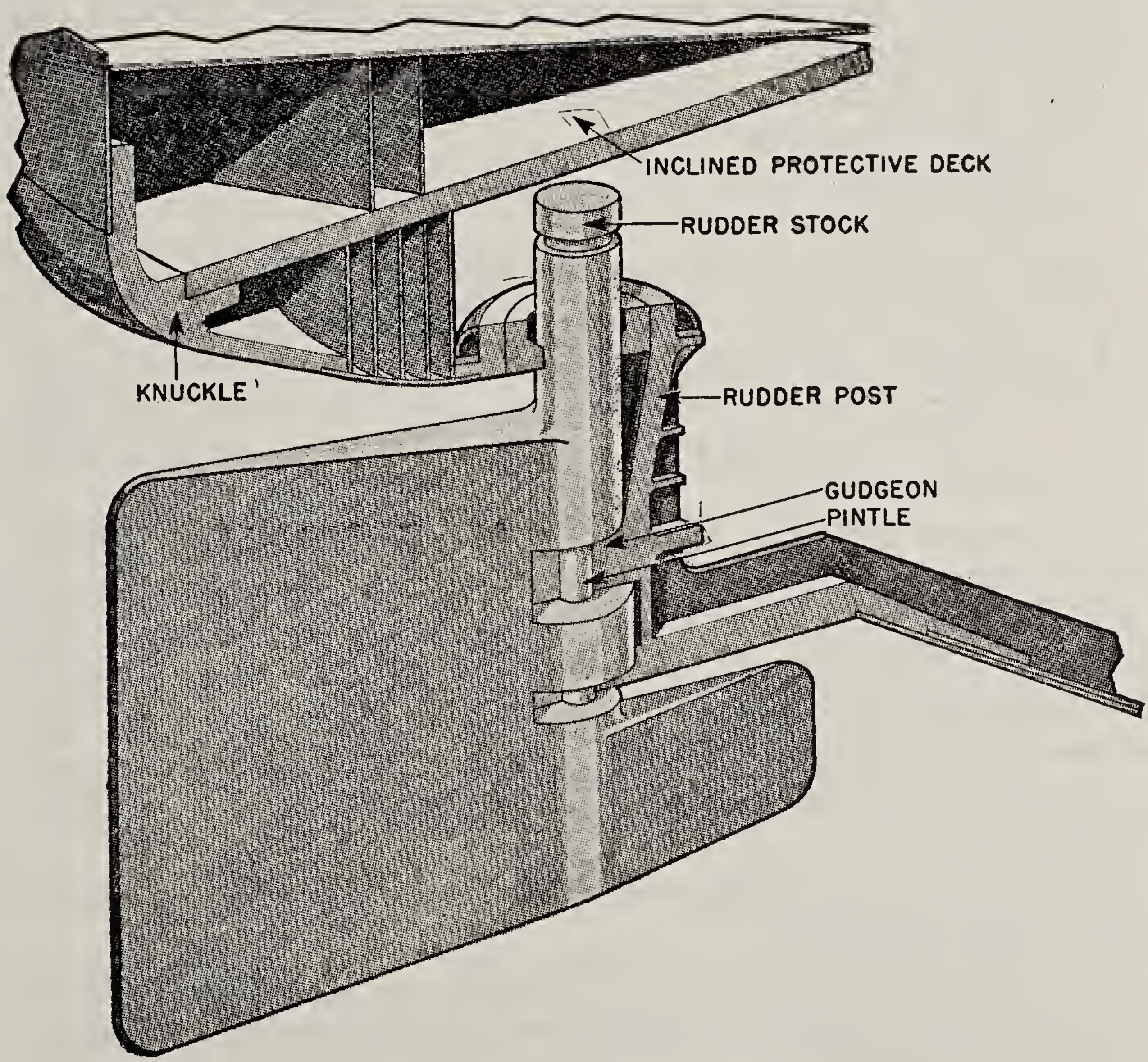


FIGURE 32-1.—A balanced rudder.

The size of the rudder varies according to the size and speed of the ship. Large rudders are balanced so that they may be turned more easily. The smaller section counteracts in some measure the larger turning surface of the rudder. Rudders are built to swing through an angle of 70° or 35° on each side of the center. Lugs, called positive stops, prevent further swinging of the rudder in case of damage to the steering gear. Avoid bringing the rudder against the stops.

STEERING GEAR

The rudder stock shaft extends from the rudder above the water line where the tiller, quadrant or rudder crosshead moves the rudder back and forth from the center line.

The rudder can be run by hand in small boats, by means of a tiller. In a boat with this type of steering gear the coxswain is located in the stern. If the quadrant is used, a small steering wheel is connected to it by cable, line, rods or chains and the coxswain can be located wherever desired.

Power steering gear on Navy ships are classed as follows:

1. Steam steering gear
2. Straight electric gear
3. Electro-hydraulic gear

These types of gear are further broken down into two kinds, based on the control used: the follow-up and non-follow-up types.

The follow-up type turns the rudder to the angle indicated by the steering wheel. The non-follow-up type turns the rudder until the distant controller is brought to the off position. All of our latest ships are the follow-up type.

All steering gear can be operated from several distant steering stations as well as from the machine itself. The usual steering stations are the bridge or pilot house, conning tower, control station and secondary conning station. The distant control of the steering gear is maintained by one of the following methods depending on the type of steering gear in use: 1. Electric controller, 2. Hydraulic telemotor, 3. Selsyn or synchroties, 4. Wire cables, chains, rods or a combination of them.

There is also a stand-by method of steering consisting of one or more of the following:

1. Hand power blocks and falls attached to the rudder crosshead or quadrant or a number of large handwheels geared to the rudder.
2. Electric motors driven by main or auxiliary generator or storage batteries.
3. Air motors driven from the ship's air service line.

4. Hydro-electric steering gear stand-by unit.
5. Auxiliary steam steering gear unit.

STEERING ORDERS

Each order is repeated word for word after the officer who gives it by the wheelsman to make it clear that the order is understood.

The first part of a steering order gives the direction of movement, to right or left. This gives the wheelsman time to start putting the wheel over before the second order is given, telling how far to turn the wheel.

Standard orders are as follows: *Right (left) full rudder, Right (left) standard rudder, Right (left) standard half-rudder.*

Full rudder usually indicates 30° rudder. The full 35° rudder is used only in emergencies. The rudder should never be thrown against the stops or it will jam. Standard rudder and standard half rudder vary on different ships. No two ships turn exactly the same, so each ship determines for itself the number of degrees of rudder necessary to make it turn in a standard circle. When each ship steers "standard rudder," all ships in the unit turn in the same space. The steersman should know the standard rudder and standard half rudder for his ship before taking over.

Right (left) 5 (10, etc.) degrees rudder.—This tells the angle in degrees the rudder is to be turned.

Right (left) handsomely (carefully).—Used when only a slight change is needed.

Give her more rudder.—Increase angle already on.

Ease the rudder.—Cut down angle already on.

Rudder amidships.—On center line.

Meet her.—Check the swing. Rudder is put in opposite direction. This prevents the ship from swinging past her new course.

Steady, Steady so, Steady as you go.—Steer the course you are on. If the ship is swinging note the course and bring her head to it.

Shift the rudder.—Change from right to left rudder.

Mind your rudder.—Steer more carefully, or get ready for a change in orders.

Mind your right (left) rudder.—Use more right (left) from time to time. This is given when a ship shows a marked tendency to get off her course one way or another.

Nothing to the right (left).—Do not go at all to the right (left) of the ordered course.

Very well.—Reply to report by steersman.

INSTRUCTIONS FOR GOOD STEERING

When learning to steer, remember that the compass does not move; the lubber's line (a black line on the rim of a compass which represents the ship's center line or head) which follows the ship's bow, moves. The wheel or the controller is so set that the bow will turn in the direction toward which the wheel or controller is moved. To steer a given course, move the lubber's line toward that course by turning the wheel toward the course. New steersmen frequently make large, unintentional turns in trying to make the course follow the lubber's line. When a ship has once started to swing, it will continue after the rudder has been taken off; this is due to momentum combined with the movement of the wheel and the action of the rudder.

If the rudder is left on too long, the ship will swing past the course, and the result will be yawing from one side to the other. This makes steering difficult for the ship astern, slows down your own speed, and puts strain on the steering engine. When a battleship is making a change of course, it is usually necessary to put the rudder amidship at 20° from the new course and to meet her when she is 10° from it. On smaller ships it will be necessary to leave the rudder on longer. No set rules can be given for taking off the rudder, because the proper time depends on the particular ship, the speed, the amount of swing, the force and direction of the wind, etc.

It should not be necessary to use large amounts of rudder, or even to make frequent changes, once the ship has settled on her course. Small changes are preferable to the use of large amounts of rudder because of the difficulty of getting steadied on the course, once the ship has started swinging. To steer well, the steersman must be "on the job." He must not wait until the ship is several degrees off the course before applying rudder, but must watch the compass and check the swing with a small amount of rudder as soon as the ship begins to move off her course. Also, the wheel should be turned slowly, or the controller used in the first notch, to avoid racing the steering engine. The compass, and not the ship ahead, must be observed at all times, unless orders to the contrary have been received. The higher the speed, the smaller the amount of rudder required.

A ship will frequently carry right, or left, rudder. This means the rudder may act as if it were amidships when the indicator is several degrees to the right, or left, of the zero mark. This may be due to wind, sea, error in the indicator, slack in the wheel ropes, unequal speeds of the engines, and similar factors. Regardless of the cause, the rudder should be handled as if the offset amidships were the true amidships. Information regarding any rudder that is being carried should be obtained before relieving and should be passed on. This condition may vary.

A ship frequently runs into weather which causes her to yaw or swing off her course suddenly. Some of the bad effects of this may be offset by "meeting her" as soon as she starts to swing.

It may be said that the first thing about steering is to stay on the course. In order to be classed as a good steersman, however, you should be able to do this, under ordinary conditions, without using large amounts of rudder. Also, you should be able to stay steady on your course, and should be farsighted enough to avoid the need of moving the rudder rapidly. Good steering gets the ship to its destination more quickly by making mileage in the desired direction, and by cutting down the slow-up caused by use of the rudder. Also it builds up the reputation of the ship, decreases the engineering score, lessons the chance of a steering accident, and is important to safety. So make the best of every opportunity to learn to steer.

LOGS

The speed of a ship through the water is measured by means of a patent log or by revolutions of the propeller. The taffrail, Nicholson and Forbes logs are used in the United States Navy.

The taffrail log consists of a rotator, resembling a propeller, a speedometer-like mechanism, and about 150 fathoms of line. Use of the taffrail log has largely stopped. The reasons for this are: "Speed by revolutions" is fairly reliable; the log is inaccurate when fouled by seaweed or other floating objects; the log does not record correctly during maneuvers. The log line may be cut by backing and must be taken in before entering harbor.

Both the Nicholson and Forbes logs have a tube projecting into the water through the bottom of the ship. The Nicholson log calculates the speed by the elevation of the water in the tube; the height varying with the changing pressure caused by different speeds. This type log is impractical and has also been practically discontinued. The Forbes log has a propeller projecting from the tube and its rate of turning varies with the speed of the ship. This type log has been placed on some ships.

Any patent log may, by electrical connection, record the speed and miles steamed on a bridge instrument.

SOUNDING

Sounding is finding out the depth of water. Soundings may be taken with the hand lead, sounding machines or the sonic depth finder. United States Naval Regulations require use of the hand lead when going into or out of port or approaching an anchorage, shoal or rock.

Hand lead.—The usual method of taking soundings in moderate depth of water is by the hand lead. The hand lead consists of a narrow block of lead, weighing from 7 to 14 pounds, which is attached to a marked line. Depth is found by heaving it forward and reading, by the marks on the line, the depth to which it sinks. With the ship making 12 knots, a good leadsman will get reliable soundings up to 7 fathoms. Of course, at slower speeds the lead will have time to sink even deeper before the ship moves up to it. The lead line may also be used for determining the direction in which a ship, practically dead in the water, is moving. This is done by placing the lead on the bottom directly below the leadsman and noting the direction of the motion of the ship as shown by the change of direction of the lead line from the up-and-down.

Before heaving, the leadsman takes station in the "chains," which are usually platforms projecting over each side at the after end of the forecastle. The lead is then dropped over the side and is supported in the heaving hand by a wooden toggle, inserted in the lead line about 2 fathoms from the lead; the spare line is coiled free for running, in the other hand.

To make the heave, first gain momentum by swinging the lead like a pendulum. After sufficient momentum has been gained, the lead is swung in a circle over the head. When the force is great enough, let go the lead as it swings forward and at a point about level with the forecastle. This makes it fly forward on a line a little above and practically parallel to the deck. As the ship moves ahead the spare line is heaved in rapidly; to get correct readings there must be no spare line out. The marker should be read when the line slacks slightly on account of the lead touching bottom, or when the line is taut, up and down.

Be careful in heaving the lead. If the lead is not swung fore and aft or if it is let go at the wrong time, it may land on the bridge or the forecastle and seriously injure a shipmate. If the pull is not even, the same thing may occur, or, if it is slacked, the lead may drop on the man who is doing the heaving. Ability to heave the lead may be acquired only by practice and it is necessary to practice in both chains because the right hand is used for heaving from starboard chain, and the left hand for heaving from the port chain.

A good heave has no value unless the depth can be read correctly and quickly. Learn the markings of the line, which are as follows:

1. At 2 fathoms, 2 strips of leather.
2. At 3 fathoms, 3 strips of leather.
3. At 5 fathoms, a white rag.
4. At 7 fathoms, a red rag.
5. At 10 fathoms, a piece of leather with a hole in it.
6. At 13 fathoms, the same as at 3 fathoms.
7. At 15 fathoms, the same as at 5 fathoms.
8. At 17 fathoms, the same as at 7 fathoms.
9. At 20 fathoms, 2 knots.
10. At 25 fathoms, 1 knot.

Also, lead lines are often marked at each half fathom over the range of depth which is most used, and may even have foot marks around the more important depths. Some lead lines are fixed so that the depth may be read at the level of the chains instead of at the water's edge. This makes it simpler to take soundings at night. Learn any special markings of the lead line which are used on your ship.

Report each sounding to the bridge in a sharp, clear voice. When the sounding agrees with one of the marks, it is reported *by the mark* as 2, 3, 5; when it falls on an even fathom between marks, it is reported *by the deep* as 4, 6, 8, or 9. If the reading does not give an even fathom, report is made as follows: *A quarter less three; And a quarter, four; And a half, four.* These mean respectively that there is ¼ fathom less than 3 fathoms of water, that there is ¼ fathom more than 4, and that there is a half fathom more than 4. If bottom is not reached, the report "*No bottom at* ***" is made.

Sounding machine.—There are several types of sounding machine, but nearly all are able to take soundings because water pressure increases with depth at a regular rate. This principle is utilized by lowering to the bottom a ground glass tube or one which is chemically coated on the inside; these tubes are closed by a cap at the upper end. The ground glass, or chemical, retains a mark which indicates the point to which the water rose; by placing the tube against a scale, the depth which corresponds to this mark may be read. The ground glass tube, used in a Tanner-Blish machine, is the one usually seen. This type of tube can be dried out and used again, preferably after being washed out with fresh water, whereas

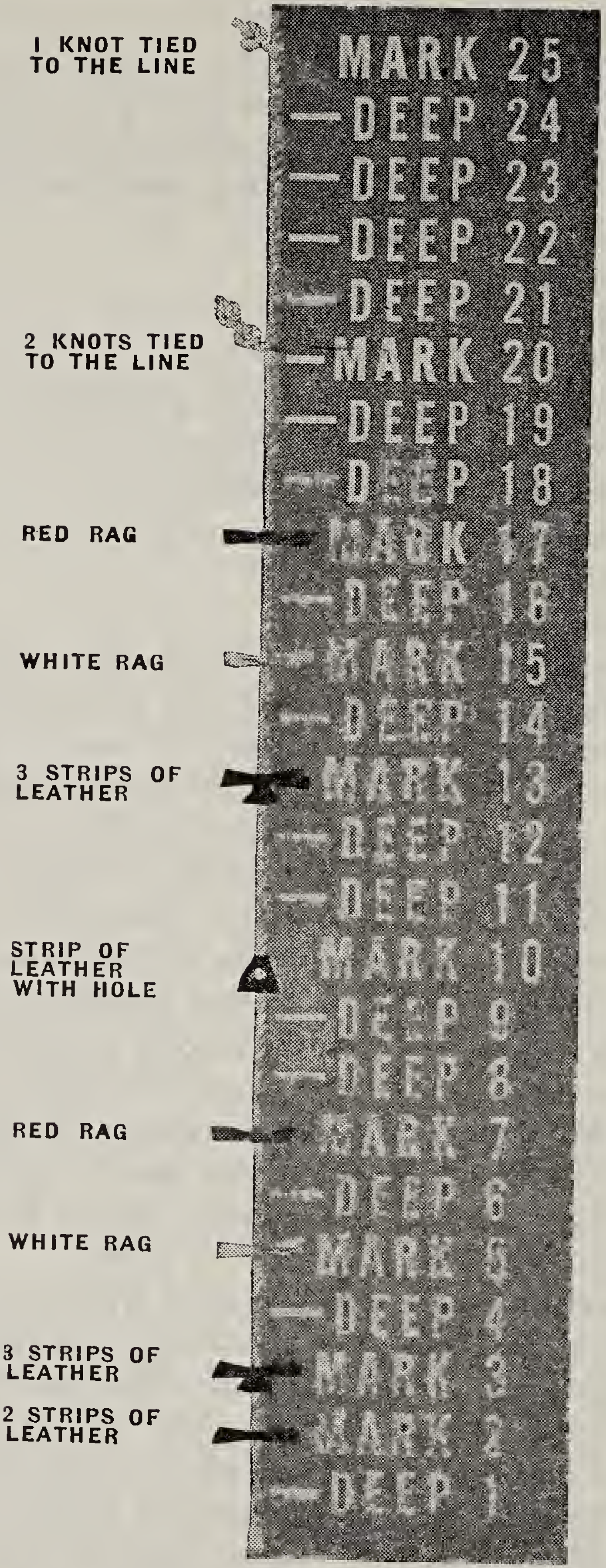


FIGURE 32-2.—Markings of the lead line.

the chemical-coated tube can be used only once, unless it is certain that the depth of water is greater than the last depth recorded by it.

A sounding machine is made up of the apparatus used to get the tube to the bottom and back. It consists of a lead, a brass tube, a length of galvanized piano wire, a drum and a stand. Several hundred fathoms of piano wire are wound on the drum, whose shaft rests on bearings at each side of the stand. The brass cylinder, in which the glass tube may be inserted, is attached to the end of the wire. Outboard of this tube, the lead, similar to a "dipsey" lead, is secured by a short length of plaited rope. This lead may also be *armed,* by packing tallow into a cup at the base of the lead. Samples of the bottom stick to this tallow, and by comparing the type of bottom with data given on the chart the navigator may learn his position more accurately.

The sounding machine is handled by a quartermaster, but he is helped by a seaman. The sounding machine may be used without slowing the ship, but deeper soundings can be taken at slower speeds, and the wire may be reeled in much easier.

The sonic depth finder.—This is an electrical machine used for determining depth. With it a sound wave is bounced off the bottom, and the depth is calculated by dividing the difference in time between its leaving and returning to the transmitter, because the rate of travel of sound through water is known. Its operation is complicated, and it is usually handled by quartermasters.

CHAPTER 33

Navigation and Piloting

Navigation is the art of directing the movement of ships in any waters, in sight of land or out of sight of land. The general working of the ship and management of its power unit pertain to seamanship. Navigation is commonly divided into three elements: piloting, dead reckoning, celestial navigation.

Piloting includes conducting ships along coasts and in and out of bays and harbors. Piloting requires the greatest experience and the best judgment of any form of navigation.

Dead reckoning.—This was originally called *deduced reckoning* and abbreviated to "d-e-d" or "dead" reckoning. It is an element both of piloting and of navigation beyond the sight of land. In modern navigation it is the process of finding the approximate position of the ship by plotting courses and distances from the last known positon, which may have been found from lighthouses or buoys or from observations of the sun, moon or stars.

Celestial Navigation.—This is also called *nautical astronomy.* It consists of fixing the position of the ship from observations of the sun, the moon, or of the planets and the principal stars.

PRINCIPAL NAVIGATIONAL AIDS

Navigators, especially when near the coast, use many instruments, tools and sources of information. Knowing how to use these aids together with experienced judgment is the basis of safe conduct of ships. The principal tools used in navigation are: compass, lead and line, sextant, patent log, parallel rulers, dividers, binoculars, watch or clock, stop watch, barometer, deviation card; flashlights, pencils. If radio beams are available, broadcast receiver, direction finder and radio beacon chart are also used. The publications listed in Chapter 34 are used to assist in navigation.

COMPASS ERROR

The term "compass error" is used to describe a condition which can be defined more accurately for bluejackets as compass difference.

Positions of ships at sea and localities ashore are determined geographically. This is done by dividing the earth's surface with imaginary lines called meridians of longitude each of which passes through both the North and South Geographical (true) Poles—which are the ends of the axis upon which the earth rotates. So imagined, the earth has the appearance of a peeled orange, the meridians of longitude having the appearance of the seams that separate the orange's sections. The crossing lines of position are the parallels of latitude —imaginary lines circling the earth parallel to the equator. Position is determined by calculating the distance in degrees, minutes and seconds east or west of the meridian of Greenwich, England; and the distance in degrees, minutes and seconds north or south of the equator.

In taking passage from one geographic point on the earth to another, a geographic (true) direction (course) is determined from the track between the points on a chart. Until recently the only instrument known that could indicate direction without assistance was the magnetic compass.

The magnetic compass, essentially, is a bar magnet free to rotate on a central pivot. The earth, too, is a huge magnet, with magnetic poles, like those of the bar magnet used as a compass. When two bar magnets are placed end to end, one pair of ends clings together but if one magnet is reversed the attraction is no longer there. Because of this principle, one end of the bar magnet in the compass is attracted by the north magnetic pole of the earth. The pivoted bar magnet, being free to swing around, will turn from any position until it points to the Magnetic North pole.

Unfortunately, even when at sea in a non-magnetic ship, the magnetic compass does not point to the true North Pole unless it is positioned so that it points to the Magnetic North Pole also. The true North Pole is located at the approximate center of the Arctic Ocean, the Magnetic North Pole is located in Baffin Land, northern Canada. A similar difference exists at the South Pole.

Being thus concerned with true direction, navigators express the difference between the true direction and the direction indicated by compass as the "compass error." For convenience in calculating the compass error, both true and magnetic direction are expressed in degrees, minutes and seconds.

An instrument which does point to the true north is the gyrocompass. It is not affected by the magnetic pole.

Variation.—The part of a magnetic-compass error which develops from the fact that the true North Pole and the Magnetic

North Pole of the earth are widely separated is called *variation.* Exactly as the imaginary meridians are drawn through the geographic poles, similar magnetic meridians are drawn through the magnetic poles of the earth. To determine the variation at a certain locality, refer to a magnetic chart of the world and determine which magnetic meridian passes through, or closest to, the locality. On small-scale charts covering a large area, magnetic meridians are also drawn, and a similar procedure obtains the variation at your position. On large-scale charts covering a small area (such as a harbor chart), where the same variation exists throughout, the variation is given in the center of the compass rose. Generally speaking, variation remains constant as one journeys north or south, but changes when moving east or west. Variation remains the same when the ship changes course—in a certain locality it is constant on all headings. It is expressed in degrees, minutes and seconds—easterly if subtracted from true and westerly if added to true, to obtain the magnetic course of a true chart track. Variation applies to all magnetic compasses, boat as well as ship.

Deviation.—In addition to variation, each compass has a further error peculiar to itself called *deviation.* This error comes about solely because of the location of magnetic influences affecting the compass. Ship compasses on the navigating bridge of large steel ships are under considerable magnetic influence, and boat compasses in nonmagnetic wooden boats are under slight magnetic influence from the metal of engine, canopies and tools. Going back to the example of the large magnet representing the earth, and a small magnet representing the compass card, if you can imagine a third magnet of medium size turning under the small magnet you will have a picture of the effect of ship magnetism on the navigating magnetic compass.

At one point of a 360° turn, the north-seeking pole of the ship's magnetic field will be toward the Magnetic North Pole of the earth and will not deflect the compass card. At another point nearly opposite, the south-seeking pole of the ship will be toward the Magnetic North Pole of the earth with the same result, because the earth magnetism is stronger and completely neutralizes the ship magnetism through direct opposition. On all intermediate courses on both sides of these two courses—not usually north and south—the ship magnetism is applied at an angle and deflects the compass card from the magnetic influence of the earth. The amount of this deflection on a certain heading is the deviation for that heading. "Swinging ship" is an evolution for determining the deviation on all headings for the construction of a deviation table. This table is used to pick off the deviation when a change of course is to be made. Deviation is expressed in degrees, minutes and seconds—easterly if added to the compass course, westerly if subtracted from the compass course to obtain the *magnetic course* of a compass course being steered.

Applying the compass error.—There are three methods by which courses or bearings may be expressed: (1) True, when they refer to the earth's geographical meridian; (2) magnetic, when they refer to the earth's magnetic meridian (these bearings and courses must be corrected for *variation* in order to make them true); (3) compass, when they refer to the angular distance from true north indicated by the compass on a given heading of the ship (these bearings and courses must be corrected for the *deviation* on that heading for conversion to magnetic and for both *deviation* and *variation* for conversion to true).

As stated before, in navigational work all courses and bearings are true. It is, therefore, highly important to know how to apply errors due to variation and deviation to the compass readings in order to obtain true courses and bearings. The following general rule applies:

"When the effect of the compass error, whether arising from variation or deviation, is to draw the north end of the compass magnet to the right, or eastward, the error is named east, or positive. When the effect is to draw the north end of the compass magnet to the left or westward it is named west, or negative."

To illustrate this rule, suppose first of all there is no error in the compass due either to variation or deviation. Then if a ship is moored so that the bow points to true north, the ship's compass having no error will settle with the zero point on the compass directly opposite the "lubber's line." In other words, the compass is on true north.

Now suppose with the ship's bow still pointed north true, we introduce variation only. We notice that the north end of the compass magnet and card are drawn off the true meridian. The compass does not point to true north, but lies in the magnetic meridian and points to magnetic north. Suppose the compass were drawn off to the left, or westward, and the compass, instead of having the zero point opposite the "lubber's line," has the 10° point opposite the "lubber's line." That means there is a compass error of 10° due to variation. But is it east or west? From the rule above, the effect of the error is to draw the north end of the compass magnet to the left, and the

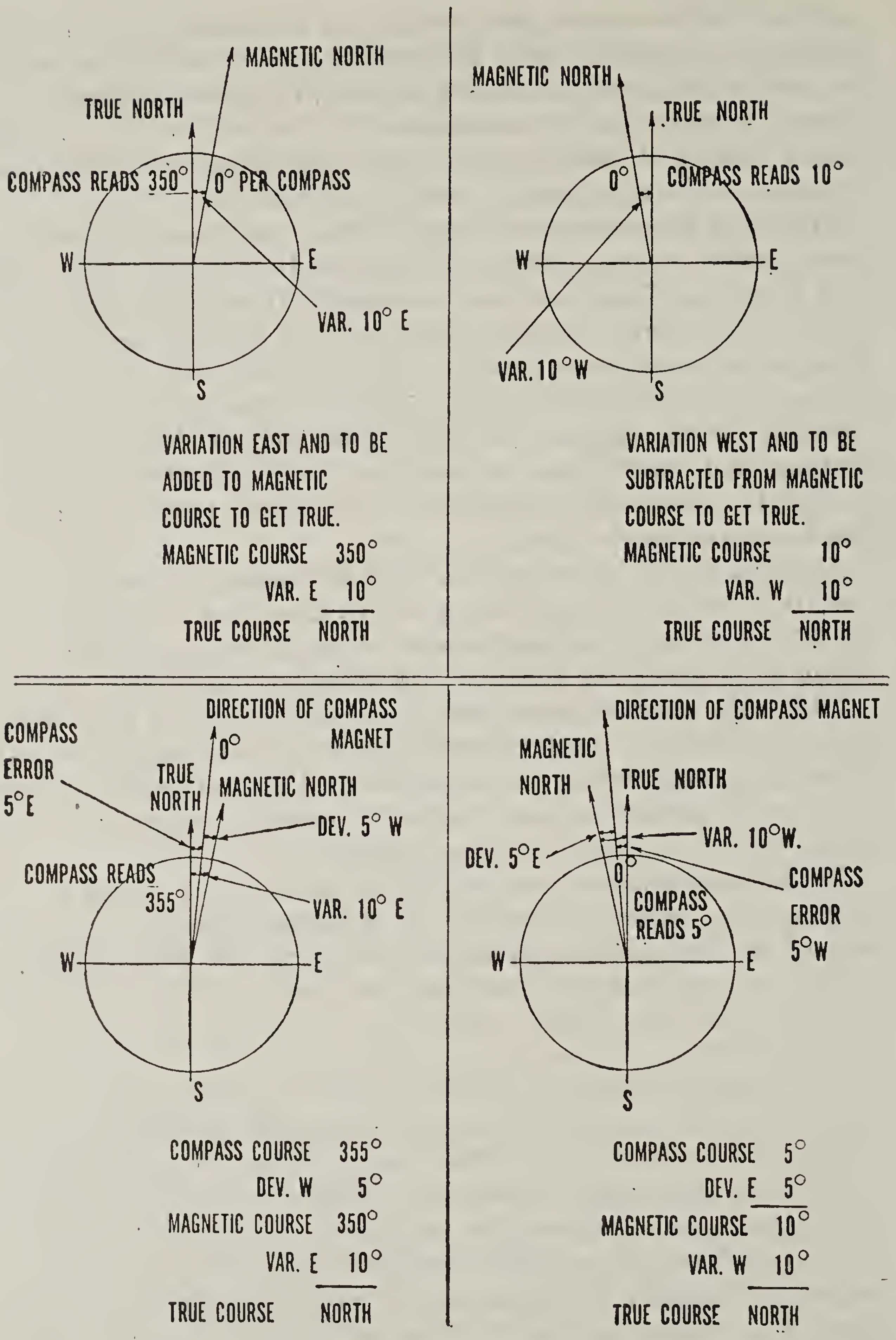


FIGURE 33-1.—Applying variation and deviation.

error is therefore named west. We subtract the error from the compass course to get the true course. The heading by the compass is 10° magnetic. Similarly, if the north end of the compass had been drawn to the right, the compass would have had the 350° point opposite the "lubber's line," and the error would have been east, and we would add the error to the compass course to get the true course. (See figure 33-1.)

Now, suppose, further, that with the ship's bow still pointing to true north and the compass reading 10° magnetic we introduce deviation. We notice that the north end of the compass magnets are drawn out of the magnetic meridian. Suppose the compass, instead of having the 10° point opposite the "lubber's line," has the 5° point opposite the "lubber's line." That means that the effect of the deviation has been to draw the compass magnet 5° to the right or that the compass has an error of 5° due to deviation. Is the error east or west? The effect has been to move the north end of the compass to the right and the error is therefore 5° east. Similarly, if the north end of the magnet had been drawn to the left or westward the error would be 5° west. (See figure 33-1.)

As stated before, variation and deviation are combined algebraically into the compass error. Using the above as an example, 10° westerly or minus variation, combined algebraically with 5° easterly or positive deviation.equals a 5° westerly, or minus, compass error. As shown, under these conditions the compass reads 5°, and applying the 5° westerly, or minus, compass error to the compass reading gives us 0°—or true north—the actual heading of the ship. The same is true regardless of the size or sign of the errors due to either variation or deviation.

It follows, then, that:

1. We add easterly and subtract westerly deviation to compass course to get magnetic.
2. We add easterly and subtract westerly variation to magnetic course to get true.

Likewise, the reverse is true:

1. We subtract easterly and add westerly variation to true courses to get magnetic.
2. We subtract easterly and add westerly deviation to magnetic courses to get compass.

Variation and deviation errors may be combined algebraically and the algebraic result applied to the compass course to get true course.

Also the reverse is true: variation and deviation errors may be combined algebraically and the algebraic sign reversed and applied to the true course to get compass course.

It follows, then:

1. If the compass course is greater than the true course the compass error is westerly.
2. If the compass course is less than the true course, the compass error is easterly.

TAKING BEARINGS WITH MAGNETIC COMPASS

To obtain accurate results, bearings should be taken when the ship is on an even keel and not yawing, and when the bubble in the spirit level on the azimuth circle or pelorus shows these to be horizontal. It requires practice, especially in a seaway, to become proficient in choosing the exact instant when the ship is momentarily steady and the level bulb properly centered.

From the compass direct (when compass is so placed that an unobstructed view of the object may be had).—Install the azimuth circle on the compass, and see that it trains easily.

Warn the steersman to stand by to give you the ship's heading when you sing out "Mark."

Sight through the vanes of the azimuth circle on the object of which a bearing is desired. This is similar to aiming a rifle at a target. The rear vane (the one nearest your eye) corresponds to the rear sight of the rifle, the front vane to the front sight, and the object (lighthouse, ship, beacon or whatever it may be) to the target.

When the ship is steady and the bubble is in the middle of the spirit level, sing out "Mark" and take the bearing.

This corresponds to firing the rifle when it is steady on the bullseye of the target. The compass reading of the bearing is obtained at the "Mark" by glancing down at the reflection of the compass card in the mirror which is fixed beneath the front vane. To do this it is unnecessary to move your head, but a little practice is needed before skill can be obtained. Having obtained the bearing, note the time quickly. Record in your notebook this bearing and the time. Ask the steersman what the ship's head was and record this.

You may convert the bearing by compass to the true bearing by applying the compass error to the compass bearing, as previously explained. Since the inner lip of the azimuth circle is graduated clockwise, in degrees from 0 to 360, the relative bearing of the object may be read at the lubber's line.

Restow the azimuth circle.

It saves much time to work out the compass error previous to taking bearings and have it ready to apply to the compass bearing immediately after you take the bearing. This can be done easily by getting from the chart the corrected variation for the ship's approximate position, and the deviation from the card for the course being steered. The steersman will generally be able to keep sufficiently near this course so that it and the ship's head at the instant of the "Mark" will vary so slightly as not to affect the deviation.

If you wait until after taking the bearing before working out the compass error, it will cause delay in plotting, which may be an important consideration in piloting at high speed. Therefore, have the compass error ready beforehand, even though you may be obliged to work out a new one after taking the bearing. In a seaway with the ship rolling and yawing it may be necessary to work out a new compass error, due to the ship being radically off the course, thus requiring a different deviation.

From the pelorus or dumb-compass (when the object cannot be seen from the compass).—Remove the pelorus cover. See that the sighting bar moves with just sufficient friction to make it easy to train; it must not be free to revolve with the motion of the ship. This adjustment can be made by means of the clamping screw in the center.

When finished taking bearings replace the cover.

First method.—Warn the steersman to stand by to give you the ship's heading when you sing out "Mark."

Sight through the vanes of the sighting bar on the object, as explained for the azimuth circle. Sing out "Mark" when you take the bearing and clamp the sighting bar. Note the time. From the steersman get the ship's head at your "Mark," and set this heading on the graduated circle of the pelorus. This setting is accomplished as follows: for example, if the ship's head was 135° by the compass, you would turn the inner circle of the pelorus until the 135° mark coincides with the lubber's line. This lubber's line may be a line inscribed forward on the immovable outer ring, or it may consist of a pointer directly above or beneath the graduated glass circle, depending upon the make of pelorus. Meanwhile the sighting bar is clamped and remains in the direction of the bearing while the inner circle is being set to the ship's head.

Now read the bearing. As the pelorus has been set to the same heading as the compass, the bearing by the pelorus will read the same as though it had been taken directly from the compass. The front vane of the sighting bar of the pelorus has attached to it a small pointer or metal arrow which touches the rim of the graduated circle and indicates the reading of the bearing.

Record this data in your notebook: the ship's head, the time and the bearing.

Apply the compass error to the bearing by compass (pelorus) in order to get the true bearing.

Second method.—Tell the steersman that you are about to take a bearing from the pelorus, and for him to sing out "Mark" when he is steady on the course.

Knowing the ship's course by compass, apply the compass error to it to obtain the true course, in the same manner as previously explained.

Set this true course on the inner graduated circle of the pelorus.

When the steersman sings out "Mark" take the bearing of the object, clamp the sighting bar, and note the time.

Read the bearing (as in the first method), and record it together with the time and the ship's head (which in this case is the ship's course).

As the pelorus has been set for the true course of the ship the bearing that you obtain when the ship is exactly on the course will be the true bearing.

TAKING BEARINGS WITH GYROCOMPASS

The master gyro is never installed on deck where bearings can be taken from it. Gyro repeaters are located in various places about the ship, suitable for steering, for taking bearings or for gunnery purposes. Unlike the magnetic compass, a gyro repeater is often set with the lubber's line at an angle with the fore and aft line of the ship. These repeaters should not be used for taking bearings. Only the gyro peloruses, which are set with the lubber's line in the fore and aft line of the ship, or other gyro repeaters suitably mounted for taking bearings, should be used for that purpose.

The act of leveling and of sighting the vanes of the azimuth circle on the object and taking its bearing is exactly similar to that described for the magnetic compass.

The main differences are that you do not have to give a "Mark" to the steersman nor do you have to note the ship's head.

The inner graduated circle of the pelorus consists of a gyro repeater, which does not have to be set as did the magnetic pelorus,

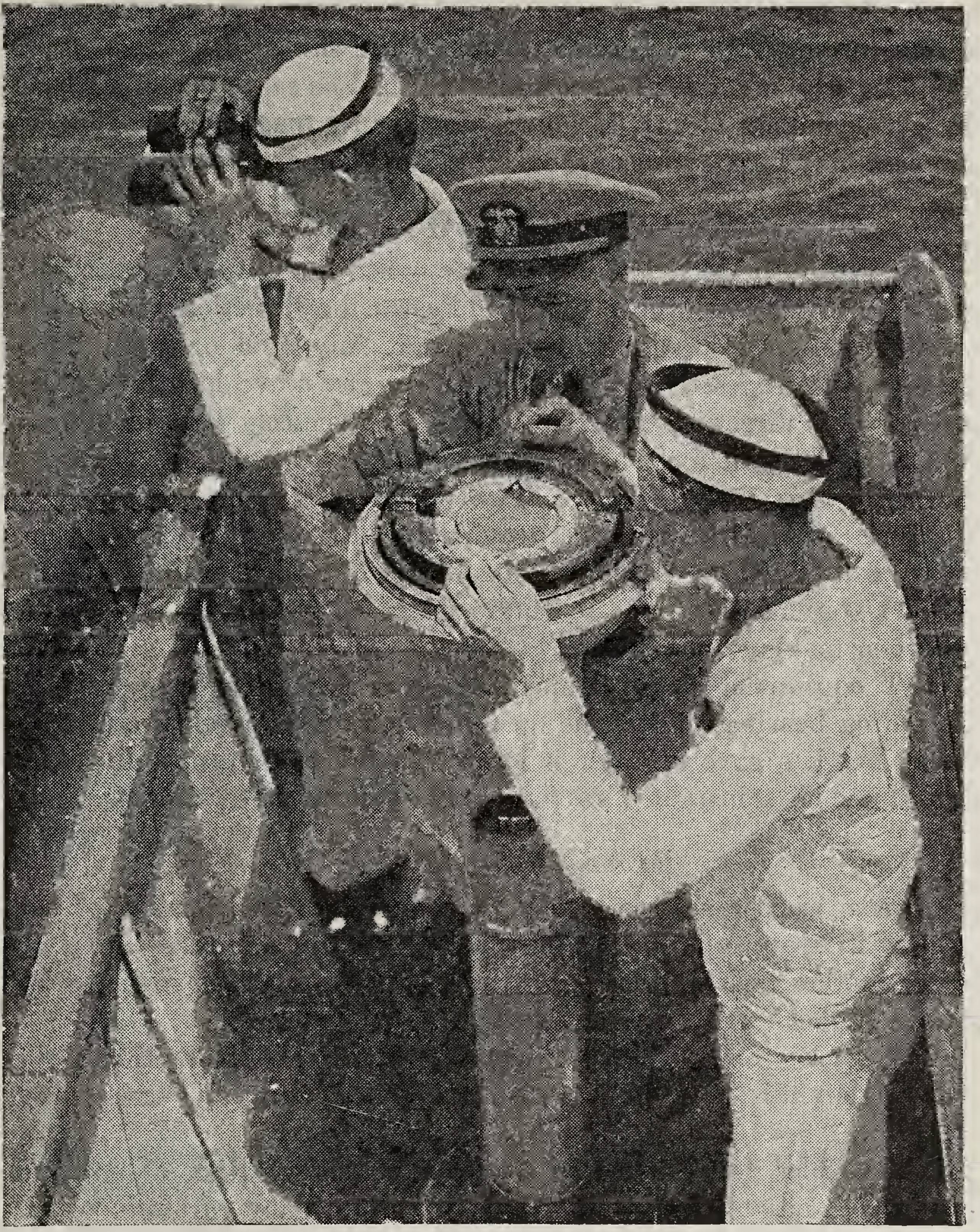


Figure. 33-2. Taking a bearing from the pelorus.

but acts in unison with the gyrocompass, and consequently gives at once the true bearing (subject to correction for any mechanical error) regardless of the ship's head. When taking bearings, repeaters must be checked frequently with the master gyro.

Record in your notebook this true bearing and the instant of time you took it.

Should the gyro repeater in the pelorus become inoperative, it is a simple matter to disengage it and to use the pelorus as a dumb compass. The inner graduated circle can then be set to the ship's head by gyro-compass (true), if functioning, or by magnetic compass, as the case may be. Bearings are taken in the manner already described.

RADIO DIRECTION FINDER

The radio direction finder, by some called the radio compass, is a radio receiving apparatus which indicates the direction of a transmitting station from the direction finder. Any kind of radio transmission—messages, signals, etc.—and on any wave length—can be used by the direction finder to "point" the sending ship or station.

If the direction finder (D/F) is on land it can "point" the position of a ship sending at sea. Two or three of them, separated by distances along a coast, can provide simultaneous "points" (bearings) which will cross when plotted from the chart positions of the (D/F) stations. Positions so obtained are of great use during a fog or when making a landfall.

D/F equipment on ships may use either relative or true scales in recording bearings. The scale on the D/F itself is a relative bearing scale, but if a gyro repeater is located in the D/F station, the bearings may be transmitted to the bridge converted to true bearings.

BEARINGS OF SHIPS

At sea, when a ship is sighted, a bearing is at once taken of her. Unless it is quite plain that her course will not interfere with your own, another bearing is taken a short interval after the first bearing to see if the bearing has changed.

The reason for this is stated under "Rules for Preventing Collisions," but this is such an important matter that it is emphasized here.

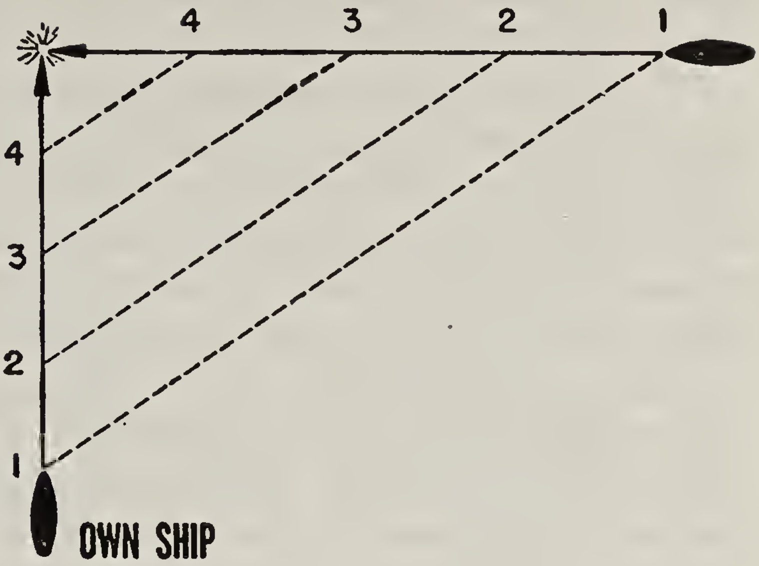
The "Rules for Preventing Collisions" state: "Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist."

Now, to determine if bearings of ships do or do not change, it is quite immaterial whether these bearings are true or per standard compass; but it is vital that each successive bearing be of the same kind as the preceding one. In other words, if your first bearing is a compass bearing the others should be, also.

A SHIP IS SIGHTED ON THE STARBOARD BOW

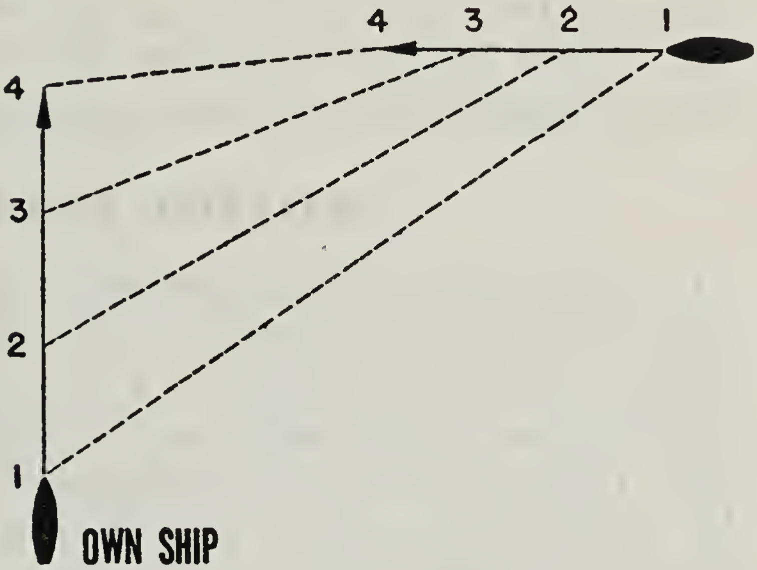
1

BEARING CONSTANT DANGER! COLLISION WILL RESULT UNLESS ONE SHIP GIVES WAY.



2

BEARING INCREASING RAPIDLY. SAFE IF SHIPS ARE FAR APART. IF NOT, OWN SHIP SHOULD AVOID CROSSING AHEAD.



3

BEARING DECREASING RAPIDLY. SAFE IF SHIPS ARE FAR APART. IF NOT, OWN SHIP KEEP CLEAR.

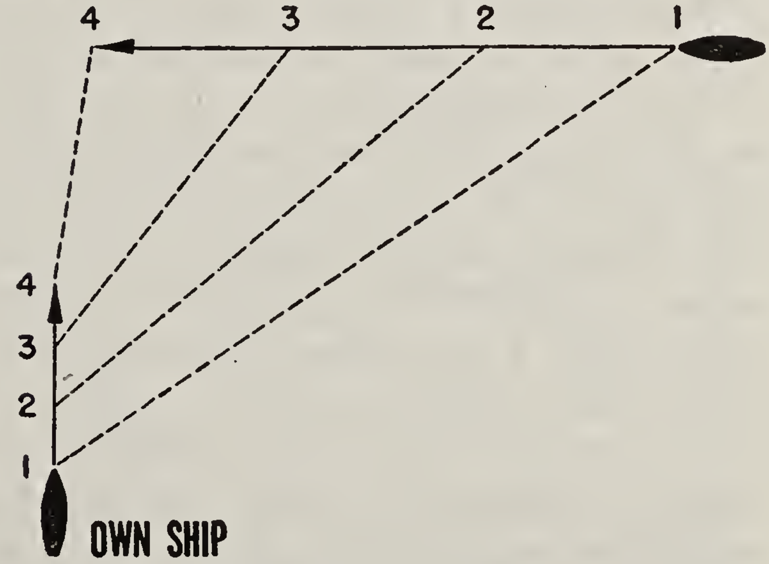


FIGURE 33-3.—Successive bearings indicate whether or not there is danger of collision.

Figure 33-3 gives an illustration of information to be had by taking successive bearings of a ship. The bearings are taken in the manner previously described.

The interval of time between bearings depends upon the distance apart of the two ships, and their respective speeds and courses. Generally speaking, the greater the distance separating them and the slower their speeds, the longer the interval of time will have to be between bearings in order to make certain whether the bearings are really changing or not, due to the inability to take bearings within less than one-half degree. If the ships are close, and speeds high, then rapid bearings are possible and must be taken. The relative courses of the two ships, whether diverging or converging, also enter into the consideration of how often to take bearings. Meanwhile, you are on the safe side if you take bearings at frequent intervals—every minute or two—and continue taking them until you know for certain whether or not the bearings are changing appreciably. If in doubt, consider the bearing as not changing.

PLOTTING BEARINGS

In order to use bearings they must be plotted on the chart. All bearings should be reduced to true bearings, from 0° to 360°, before plotting them. On the chart is a "compass rose," the outer circle indicating the true direction and divided into degrees from 0° to 360°. The inner circle is the magnetic rose, and in plotting bearings this should be disregarded. Concern yourself only with the outer or true circle of direction.

Having taken a bearing (true) and recorded the data in your notebook, go to the chart and proceed as follows:

Place the parallel ruler so that its edge passes through the center of the compass rose and that mark on the outer or true circle which corresponds to the bearing obtained. Move the ruler, maintaining this direction, until its edge passes through the symbol on the chart which represents that particular object whose bearing you have taken. With a pencil draw a line lightly on the chart along the edge of the ruler, starting from this symbol and in the reverse direction of the bearing. Remove the ruler, and on this penciled line note the time the bearing was taken. The ship's position at that time was somewhere on this line. To fix that position a bearing of another object is necessary, or simultaneous "cross" bearings.

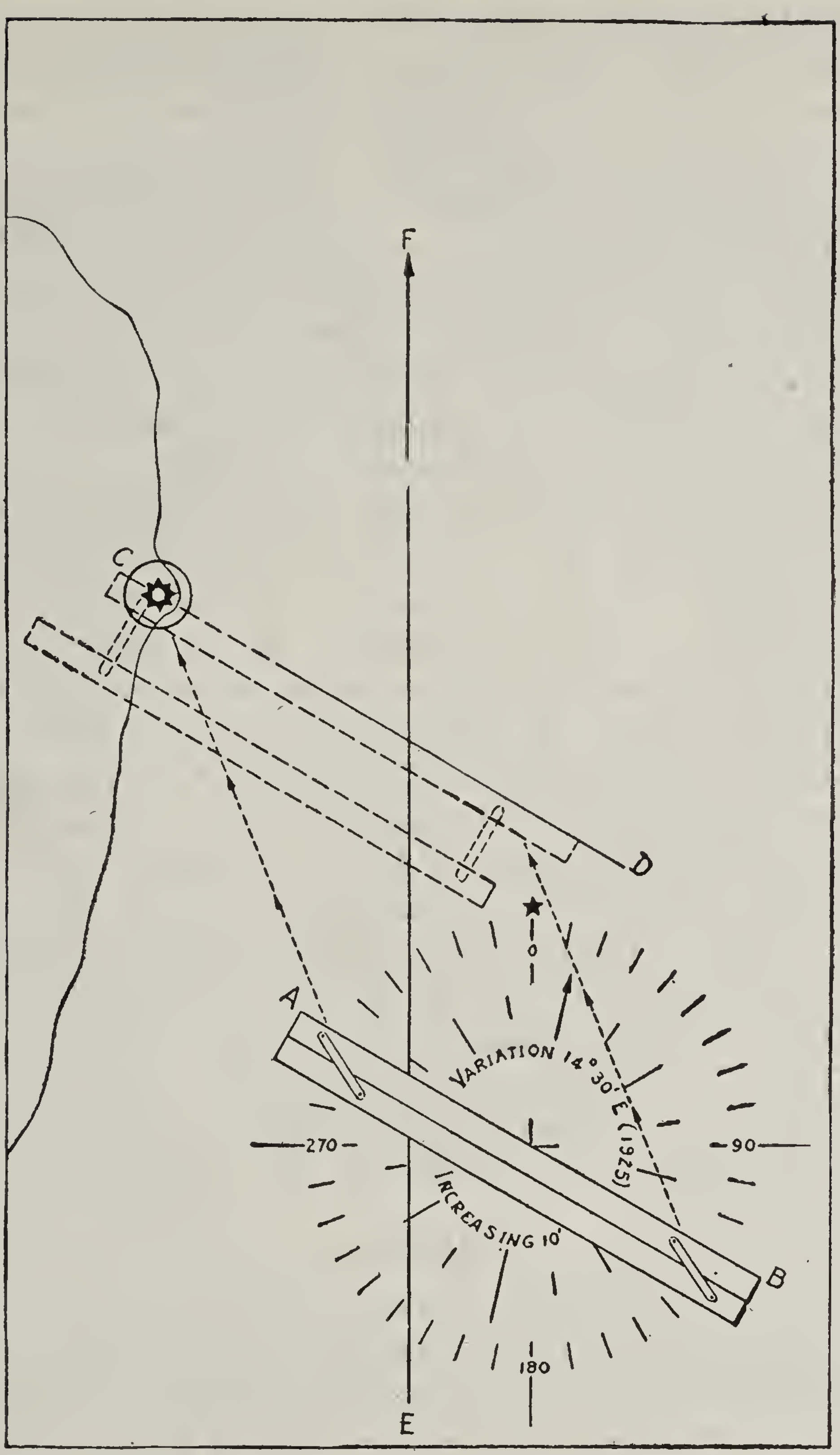


FIGURE 33-4.—Use of parallel rulers.

TIDES

Every bluejacket who handles small boats must know about tides, why they occur and the meaning of the names given to different tidal conditions. Tides are the rise and fall of water as shown at a depth gage marked on a dock or pier. Tides cause an increase or decrease of the depth of water within a harbor or inlet and to a lesser degree in the open sea. They are periodical, resulting from the rise and fall of the level of the mass of water in the open sea nearby.

At one time during the day there may be ample depth of water to float a boat, but later the same area may be dry land. Tides determine the usefulness of landings; boat landings are selected for accessibility during all stages of the tide. The slack to be left in mooring lines when securing a ship or boat to a dock is determined by the rise and fall of tide. The range of the tide also determines the scope of anchor chain used when anchoring or mooring.

The primary influence causing tides is the attraction exerted upon the earth by the moon. This attraction is strongest at the point on the earth directly under the moon. It is exerted equally upon the land and sea but only affects noticeably the sea because water can move freely in response to the force. As the moon "circles" the earth once every 24 hours and 50 minutes there is a high tide at any one harbor once every 24 hours and 25 minutes. Corresponding highs and lows are 50 minutes later in each successive 24 hour period.

Other influences affecting the tides are: 1. attraction of the sun exerted on the earth; 2. linear distances between the sun and earth (the moon varies through a single month and the sun through the year); 3. the angular distance of the sun and the moon north or south of the equator (declination). Thus a harbor would experience its highest and lowest tides with the moon and sun together on its meridian, both being at their minimum distances from the earth and both at zero declination or directly over the equator.

CURRENTS

Tides are the primary cause of currents in harbors and inlets. The secondary cause is river current in harbors situated at the mouths of streams. Where a river contributes to the current it reduces the speed of the flood current and increases the speed of the ebb current due to the volume of water backed up in the river during the flood.

Where the tides conform with the ascendancy of the moon, the time, direction and strength of tidal current are governed by the contour of the bottom and the shape of the shore line. Current determines the riding direction of a ship at anchor and the speed made going over the ground. In a long reach with a strong current, the highest speed of the current is found near the center. Speed de-

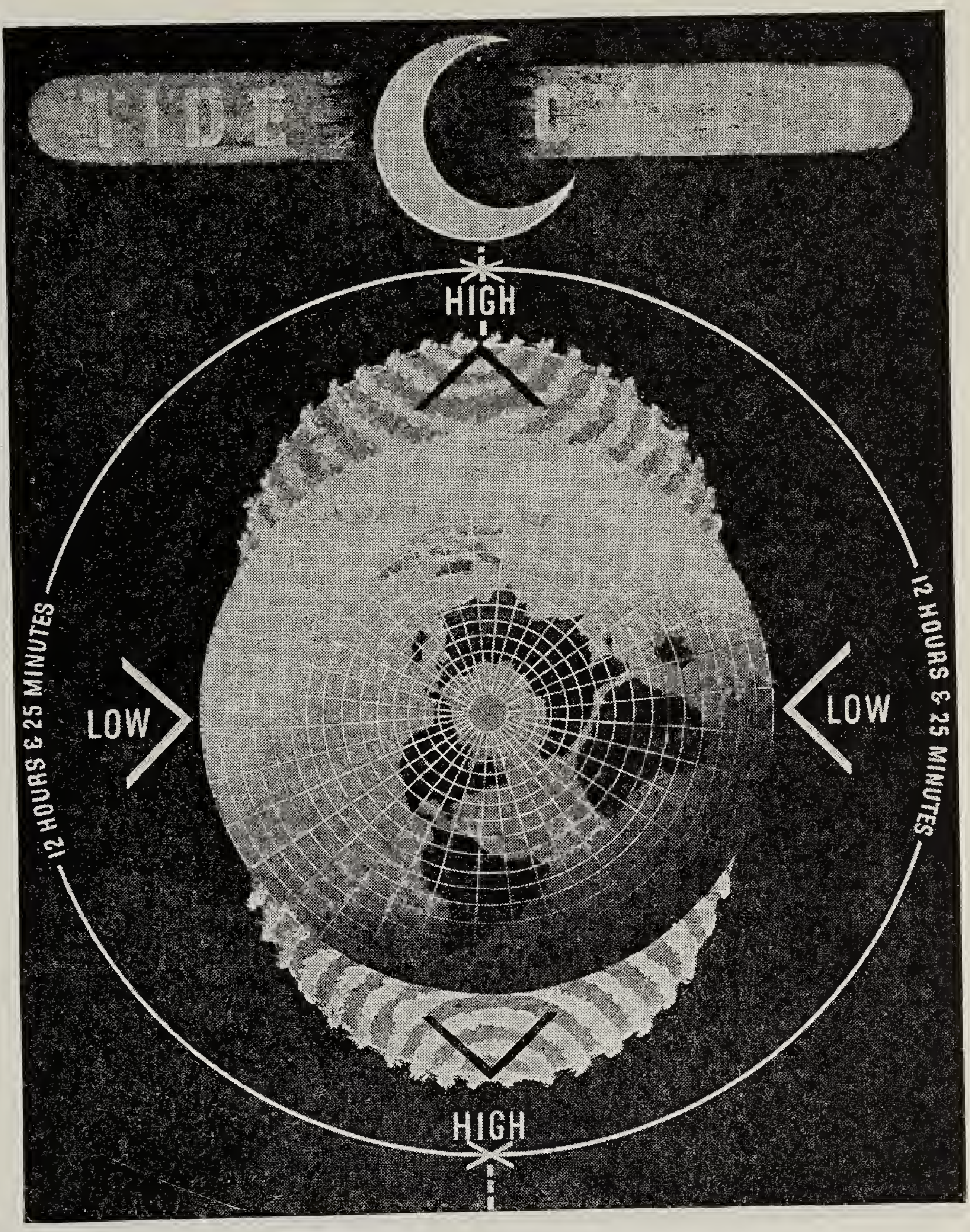

TIDE
HIGH
12 HOURS & 25 MINUTES
LOW
LOW
12 HOURS & 25 MINUTES
HIGH

Figure 33-5

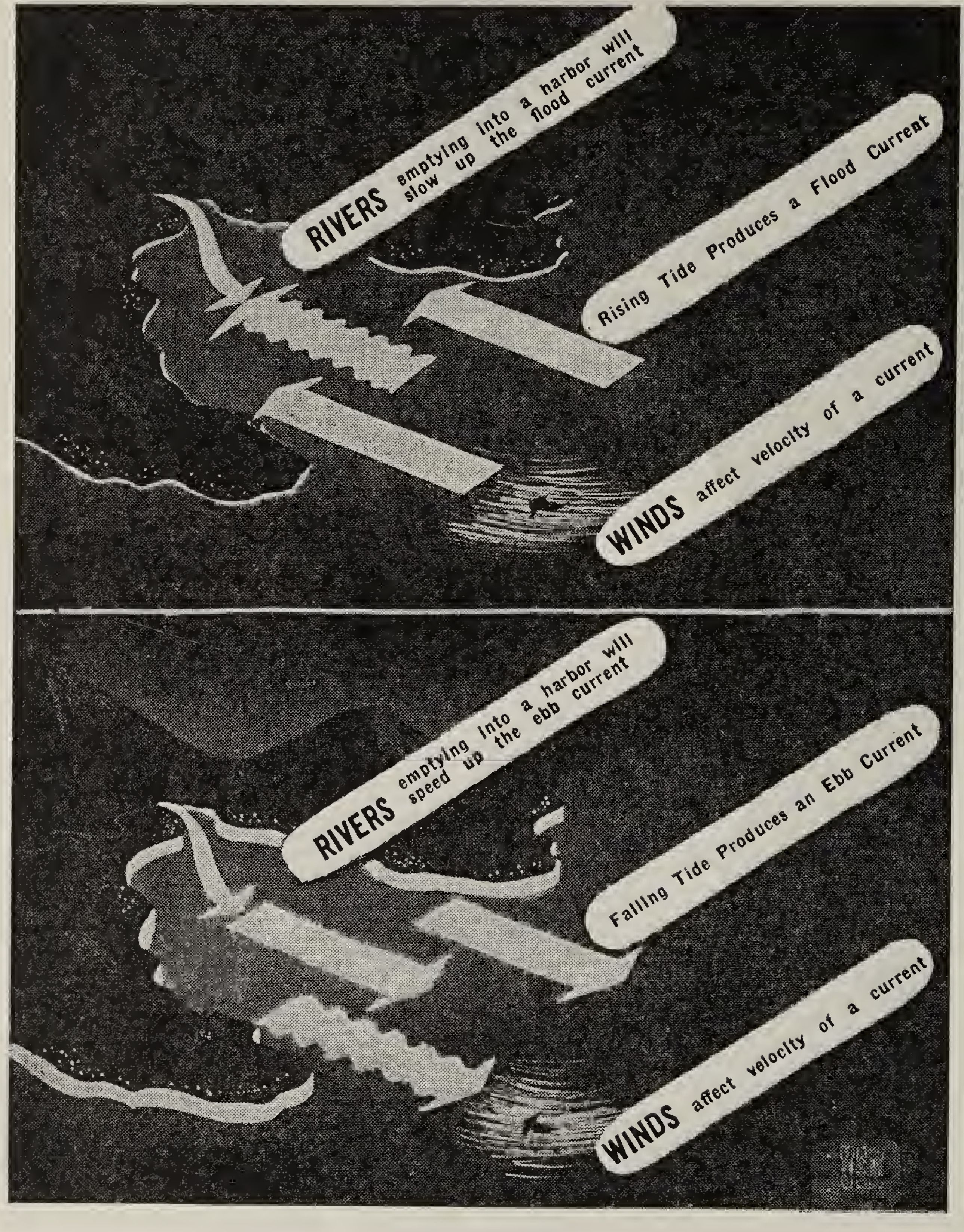

RIVERS emptying into a harbor will slow up the flood current
Rising Tide Produces a Flood Current
WINDS affect velocity of a current
RIVERS emptying into a harbor will speed up the ebb current
Falling Tide Produces an Ebb Current
WINDS affect velocity of a current

FIGURE 33-6.—Currents, tides and winds.

creases toward the sides, and at the edge a series of eddies is found forming a countercurrent with definite upstream speed. Take advantage of this eddy current until you reach a point opposite your destination, then cut sharply across to the opposite side.

Eddies occur at channel bends, around points and over marked uneven sections of the bottom. Some of them can be dangerous to small boats, and should be looked for and avoided.

Wind affects the speed of currents. A fair wind helps a current and a counter wind slows it down. Strong wind blowing directly in the mouth of the inlet produces unusually high tides because it opposes emptying at low water. In the same way, a wind blowing out of an inlet can cause lower tides than expected.

TIME ZONES

To keep standard time at sea the surface of the earth is divided into 24 zones, each bounded by meridians of 15° or 1 hour apart in longitude. The first zone has the meridian of Greenwich, England, running through the middle of it, and meridians 7½° east and west mark its eastern and western limits; it is called the *zero zone* because the difference between standard time of this zone and Greenwich mean time is zero. Each zone is in turn designated by the number of hours by which the standard time of that zone differs from Greenwich mean time.

Zones lying in east longitude from the zero zone are numbered from 1 to 12 and are called minus zones because in each of them the zone number must be subtracted from the standard time in order to obtain Greenwich mean time. Zones lying in west longitude are called plus zones because in each the zone number must be added to standard time to get Greenwich mean time. The middle of the twelfth zone is divided by the one hundred and eightieth meridian and the terms "minus" and "plus" are used in the halves of this zone which lie in east or west longitude respectively. The "zone description" of the time in a particular zone is indicated by a + or − sign.

On land the boundaries of time zones are determined by the frontiers of countries and are modified as necessary by the territorial limits of the countries concerned.

Setting clocks.—Whenever a change in time is made by order of the navigator, one of the quartermasters resets all of the ship's clocks. All clocks are checked daily in port or at sea for accuracy. Clocks are wound daily at the time they are corrected.

WEATHER

Storms.—Winds are produced by differences in atmospheric pressure in neighboring localities. These pressure differences are due, for the most part, to differences in temperature. Air, like water will

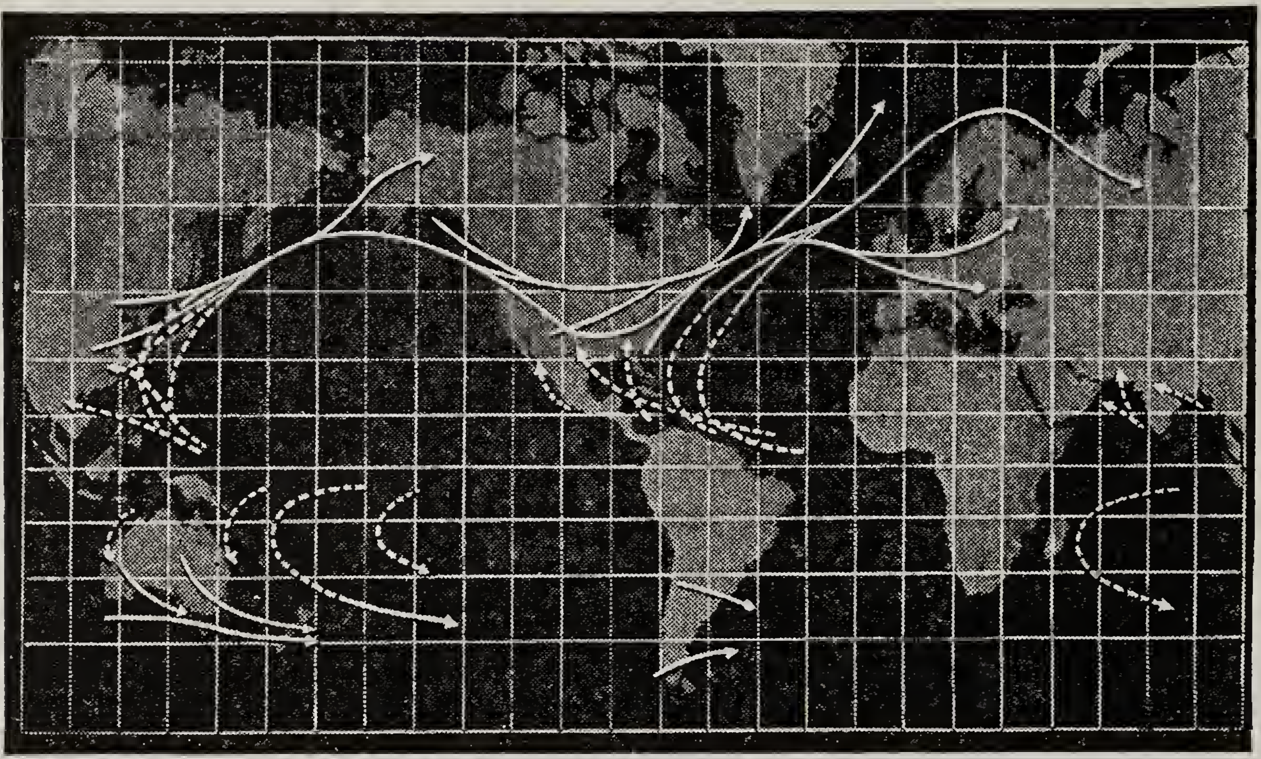


FIGURE 33-7.—Circulation of the winds on the earth's surface.

flow from a region of high pressure to one of low pressure if not held back. This characteristic, modified by the rotations of the earth and various local influences, causes the great periodic winds of the world and also the great cyclonic storms.

There are two periods of high barometer, one at about 1000 and the other at about 2200. There are two corresponding periods of low barometer at about 0400 and 1600. From 4 to 10, morning and evening, the barometer generally rises; from 10 to 4, day and night, it falls. This daily rise and fall is known as the diurnal rise and fall.

Plotting hourly barometer readings during the hurricane season in the tropics is important because changes of pressure from standard daily conditions become at once apparent. The range of the double diurnal movement is greatest at the equator where it amounts to one-tenth (0.1) of an inch. Any marked disturbance of the regularity of this movement of the mercury indicates a change of weather. In higher latitude, where the double diurnal movement is not so marked and other influences enter in, the barometer is not so reliable a guide to weather.

The general circulation of winds on the surface of the earth is from east to west in the tropics, both north and south of the equator, and from west to east in middle and high latitudes. This general circulation frequently is disturbed by local conditions particularly in the

Northern Hemisphere. If at any point in the system of air circulation there occurs a local area of low pressure, air from the surrounding region is forced inward, spirally around it.

Cyclones.—The inward flow of air described above is converted by the rotation of the earth into a whirl turning to the left or counterclockwise in the Northern Hemisphere, and in the opposite direction in the Southern Hemisphere. The name *cyclone* is given to this type of wind. It is also called *low* or *depression.* Tropical cyclones such as those in the North Atlantic, North and South Pacific and Indian Oceans, originate in the region known as the *doldrums,* that narrow belt lying between the northeast and southeast trade winds.

The South Atlantic Ocean is free from cyclones of tropical origin. The outstanding features of the tropical cyclones are: violent winds; the calm center or vortex, called the "eye"; the driving deluge of rain, and tremendous noise. The size varies; the average diameter is some 300 miles.

The northwester and southwester are mostly associated with storms along the west coast of the United States. They produce extremely high winds, depending on the character of the storm and nearness of the storm center. The northeaster and southeaster are associated with storms along the Atlantic Coast.

CHAPTER 34

Navigation Aids and Instruments

LIGHTS, BUOYS AND MARKERS

Lighthouses.—A lighthouse is so constructed as to be identified easily during the day as well as being spotted by night. It is the most reliable of all navigational aids. Most lighthouses have keepers who constantly check the operation of the light and sound apparatus. Lighthouses with no keepers are called "Unwatched Lights" and are indicated on charts and light lists with the symbol "U."

Lightships.—These are ships moored offshore marking dangerous waters or entrances. They are equipped with one or more lights and sound apparatus. They are seagoing lighthouses but are not as reliable as lighthouses on shore because they may drag, drift or be sunk. The trust navigation places on lighthouses or lightships depends on their structure and maintenance. Reliability is generally rated as follows: lighthouses, lightships, lighted beacons, lighted buoys.

Identification of lights.—Lights are designated as flashing or occulting according to the periods of light and darkness without referring to kind of light or brilliancy. At short distances and in clear weather, flashing lights may show a faint continuous light.

The period of flashing light is the time taken by an entire cycle of light and eclipse. It is the time from the beginning of one flash to the beginning of the next.

Different classes of lights are defined in the table on page 384.

Buoys.—A buoy is a floating object moored or fixed to the bottom to mark a channel, rock, wreck, anchorage, etc. Three types are used in United States waters: *nun, can* and *spar.* Several special types are used, such as *lighted buoys, bell buoys, whistling buoys,* and combinations of these.

Beacons.—A beacon is a marker or signal located near or on the shore. Most beacons are day markers only, but some are lighted for night use and some are fitted with whistles or horns to give signals during periods of reduced visibility.

Ranges.—When two beacons or markers are so located that they

CLASSES OF LIGHTS

Lights which do not change color	Characteristic phases	Lights which do change color (showing alternately white and red in various combinations)
F.—Fixed	A continuous steady light	*Alt.*—Alternating
Fl.—Flashing	a. Showing a single flash at regular intervals, the duration of light being always less than that of darkness b. A steady light with, at regular intervals, a total eclipse, the duration of light being always less than that of darkness	*Alt.—Fl.*—Alternating flashing
Gp. Fl.—Group flashing	Showing at regular intervals a group of two or more flashes	*Alt. Gp. Fl.*—Alternating group flashing
Occ.—Occulting	A steady light with, at regular intervals, a sudden and total eclipse, the duration of light being always greater than or equal to that of darkness	*Alt. Occ.*—Alternating occulting
Gp. Occ.—Group occulting	A steady light with, at regular intervals, a group of two or more sudden eclipses	*Alt. Gp. Occ.*—Alternating group occulting
F. Fl.—Fixed and Flashing	A fixed light varied, at regular intervals, by a single flash of relatively greater brilliancy	*Alt. F. Fl.*—Alternating fixed and flashing
F. Gp. Fl.—Fixed and group flashing	A fixed light varied, at regular intervals, by a group of two or more flashes of relatively greater brilliancy	*Alt. F. Gp. Fl.*—Alternating fixed and group flashing

ELEMENTS OF UNITED

LIGHTS

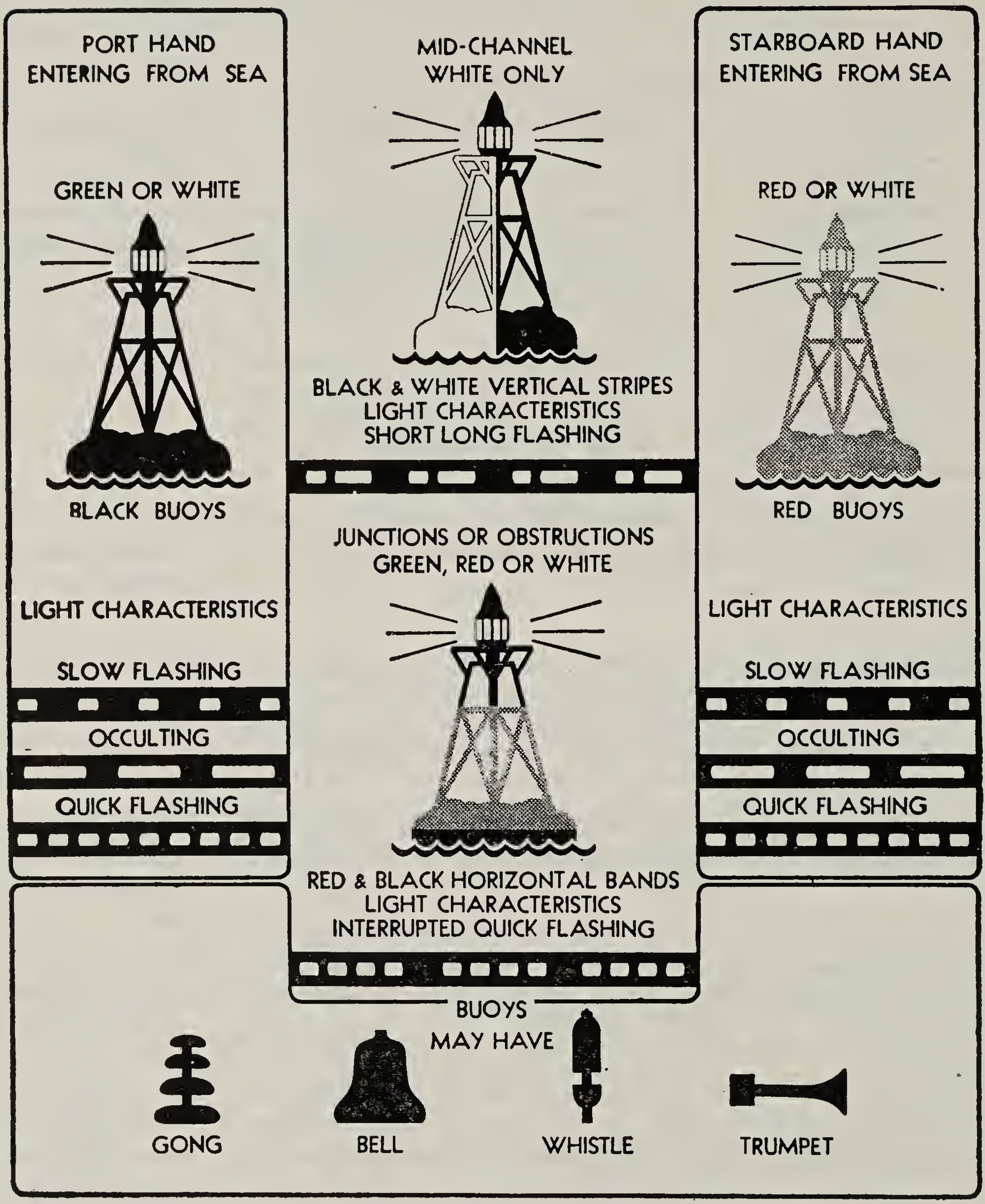


Figure 34-1

STATES BUOYAGE

SHAPES

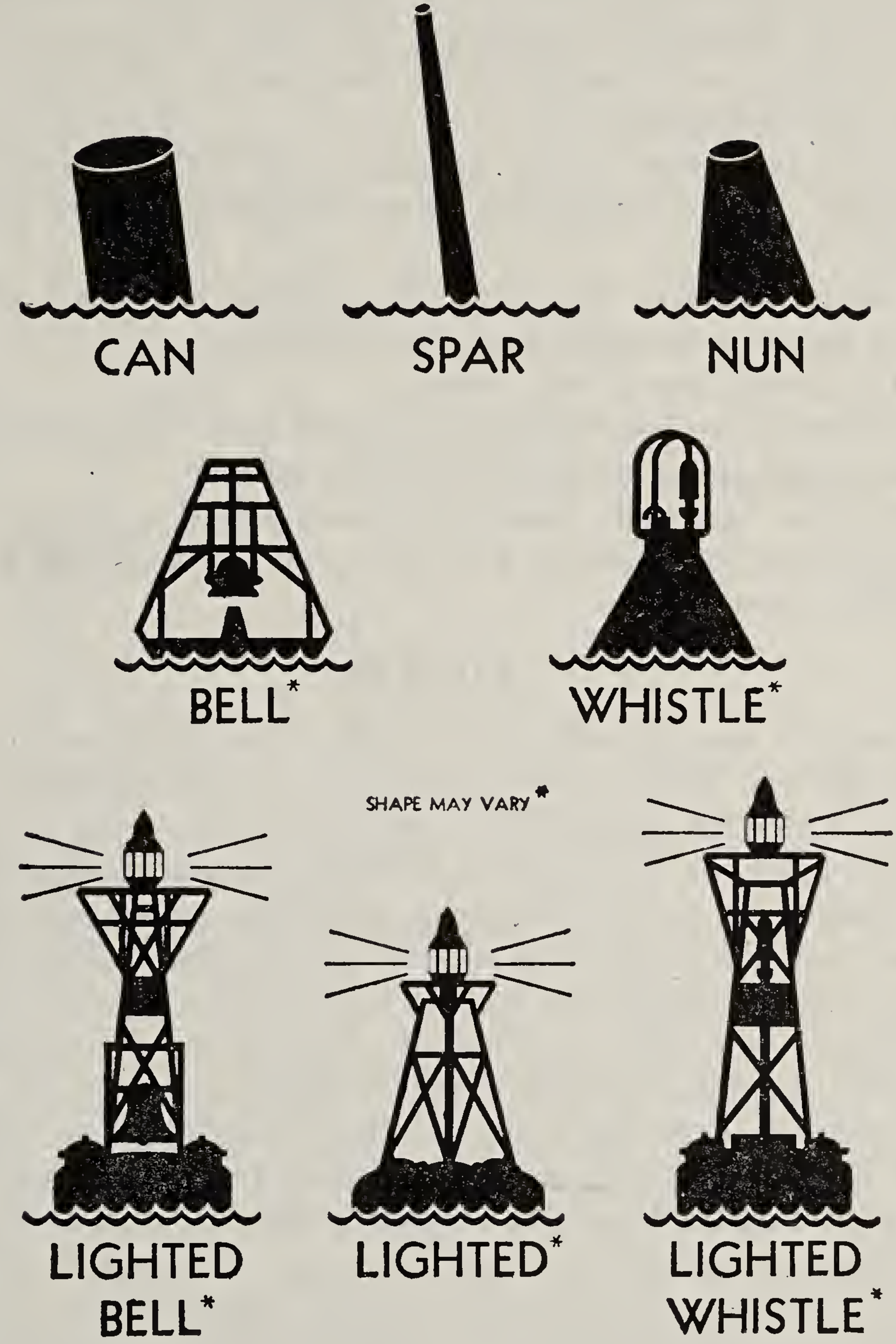


FIGURE 34-2

are in line on a definite compass bearing, they establish a range. Ranges are used as guides for entering or leaving harbors, on reaches in rivers, bays, and inlets. Ranges may be lighted so as to be seen at night as well as in daylight.

Buoyage system.—1. Coming from seaward, red buoys mark the starboard or right-hand side of the channel, and black buoys the port or left side. Remember the phrase *red, right, returning.* Starboard and port buoys are numbered from the seaward end of the channel, black, odd; red, even.

2. Dangers and obstructions, such as sunken wrecks, passed on either side, may be marked by buoys with black and red horizontal stripes.

3. Buoys indicating the fairway are marked with black and white vertical stripes and should be passed close to.

4. Quarantine buoys are yellow.

5. White buoys have no special significance. They are used for special purposes not connected with navigation.

6. Perches with balls, cages, etc., when placed on buoys indicate turning points, the color and number showing on which side they should be passed.

CHARTS

Charts are maps showing the contour of the bottom of the ocean, inlets, harbors. They are the result of ocean surveys and show the depth of water throughout the area covered by the chart, the position of ports, inlets, harbors and prominent permanent landmarks which can be seen from the sea. The small numbers scattered over the water surface show the depth at the spot where the number is found. Small italic symbols indicate the type of bottom to be found.

The most important function of charts is to give sounding information so that a navigator will always find a depth of water at least equal to that shown on the chart. Soundings in areas with small rise and fall of tide are taken at Mean Low Water, and in areas with large tides at Mean Low Water Spring. In shallow areas such as harbors, soundings are expressed in feet. On coastal and general charts of the high seas soundings are expressed in fathoms.

Charts are constructed so that the track between two points on a chart is a straight line and also the true bearing of one point from the other. This sort of map is called the Mercator Projection. On harbor and coastal Mercator charts the course line (track) also

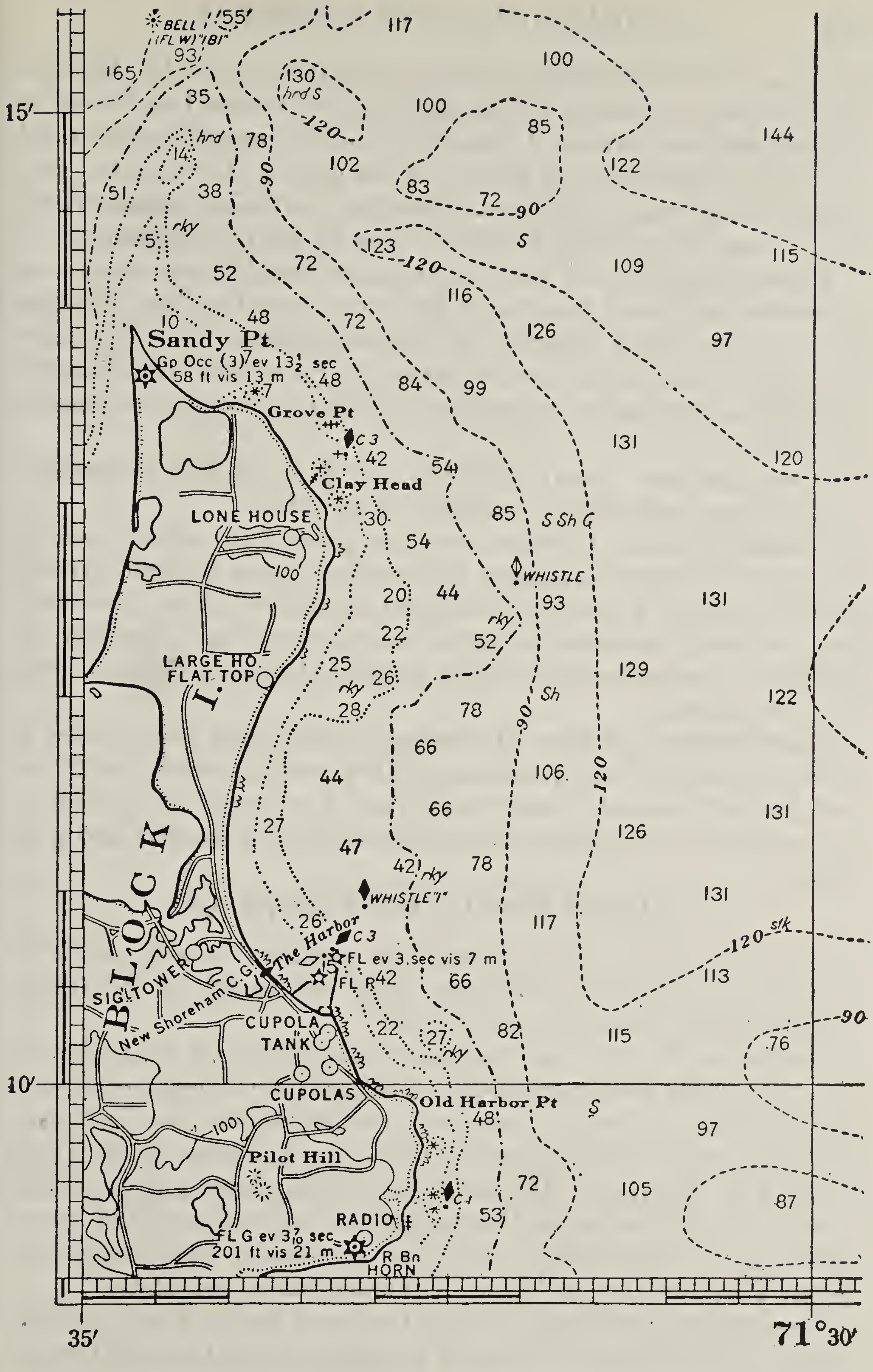


FIGURE 34-3.—Section of a chart of coastal waters.

plots as the shortest distance between the two points. On Mercator general charts or charts of the high seas the course line is not the shortest distance between the points unless the course is either north or south. Other systems of projection are used in chart making, each designed for special purposes. Each has particular characteristics which must be understood before it can be used intelligently.

Chart data.—At one point in the chart usually near the corner, chart data are found. Read carefully before using the chart. The projection system used, meaning of unusual symbols, unit of measure used in recording soundings on harbor charts, a scale measure graduated in nautical miles or yards and a record of corrections entered are given.

A nautical mile (knot) is 2,000 yards. It is equal to 1 minute of latitude measured along a meridian of longitude.

Compass rose.—Compass roses are printed at various spots on the charts to permit navigators to translate courses by using parallel rulers. The rose is a circle graduated in degrees giving true bearings, the zero graduation being true north. Some chart roses have an additional graduation scale giving magnetic bearings, the zero being magnetic north.

Corrections and care of charts.—Charts must be corrected to date according to Navy Regulations. They must be handled with care and properly stowed. Charts are arranged as nearly as possible in geographic sequence numbered consecutively and divided into portfolios.

NAVIGATIONAL PUBLICATIONS

The following is a list of important publications with which the quartermaster should be familiar. They are issued by the Hydrographic Office unless otherwise noted:

Notices to Mariners are published weekly and sent to all ships of the Navy. They give in concise form information of changes in navigational aids or dangers, changes in channel depths, etc. Each paragraph is numbered and carries below the numbers of the charts affected by the notice. Mariners may obtain these notices without charge by applying to the Hydrographic Office, to one of the branch offices, or by applying to any of the agencies in seaboard or lake ports. They are also on file in the United States consulates.

Coast Pilots, published in several volumes by the Coast and Geodetic Survey, contain information regarding the entire coast line and

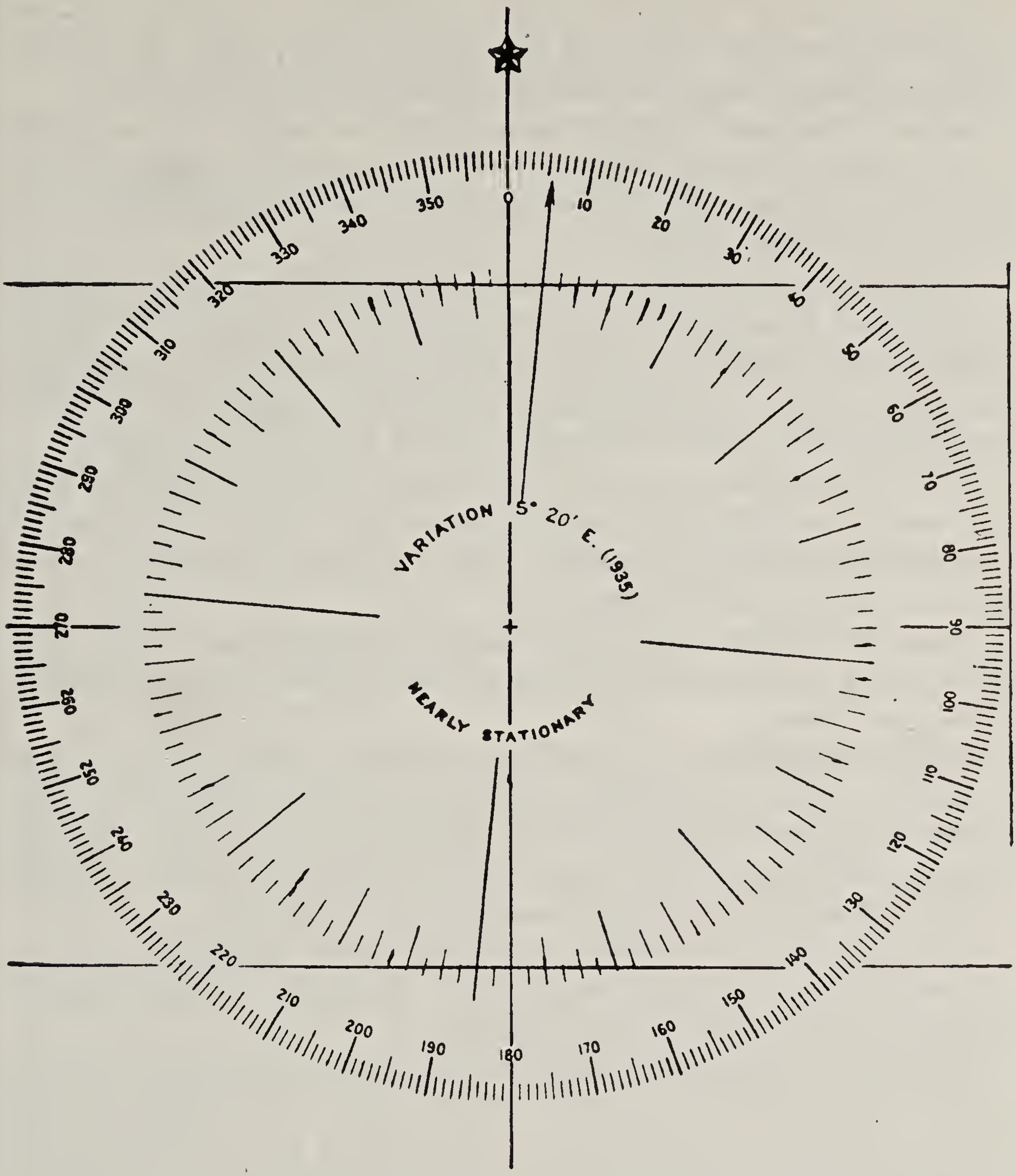


FIGURE 34-4.—Compass rose.

navigable harbors, rivers, and sounds of the United States. There are 5 Atlantic Coast Pilots; 1 Pacific Coast Pilot; 2 Alaskan Coast Pilots; 1 Hawaiian Coast Pilot; and 2 Philippine Coast Pilots.

Hydrographic Bulletin gives more detailed facts than the Pilot Charts regarding ice, wrecks and derelicts; also items on port facilities, use of oil to calm the sea and miscellaneous information of use and interest to mariners.

Ice Supplement to Hydrographic Bulletin, a chartlet, presents graphically all late reports of ice. Issued weekly with the *Hydrographic Bulletin* during the season of dangerous ice conditions.

Sailing Directions contain information to assist the navigator when cruising in foreign waters. There are numerous volumes of these directions—and the area covered in each volume is indicated on the front cover of the book.

Supplements to Sailing Directions, published annually, includes all important information from reliable sources received in the Hydrographic Office since the publication of the latest edition of the *Sailing Directions.* The information contained in each supplement should be embodied in the volume affected, and will bring it up to date.

Daily Memorandum contains reports affecting safe navigation, such as location of icebergs, derelicts, obstructions and other news of sufficient importance to publish daily. The most urgent of these items are broadcast by radio.

Naval Air Pilot contains information to assist the aviator when flying along the East and Gulf Coasts of the United States, in Mexico, Cuba and Alaska.

Notice to Aviators is a monthly publication, whose function is to furnish to aviators information which will be of assistance to them in the navigation of the air; also information concerning airports, seaplane anchorages, air routes, and, in general, all such information as affects aviation charts and the Naval Air Pilots.

Memorandum for Aviators, published when necessary, contains urgent information or information of a temporary nature concerning dangers and aids to air navigation.

Light Lists contain information regarding the characteristics of all lights and lighted buoys; also characteristics of fog signals and stations equipped to sound them. Stations fitted to sound submarine bell signals are also shown and the characteristics of the signals given. Radio beacons are listed. Each publication shows on its front cover page the area covered by it.

Tide Tables give the items of high and low water, the range, etc., in all the principal ports of the world. Also the tides in all navigable rivers in the United States of America.

Current Tables give the time of slack water, of maximum ebb and maximum flood, and the velocity of the current, for all the principal ports of the world. These tables are of particular assistance to a ship when planning to go alongside a wharf, etc.

Radio Aids to Navigation contains a complete list of radio stations throughout the world which perform services of value to navigation; it includes details of radio compass stations, radio beacons, weather bulletins, storm and navigational warnings, time signals, distress signals, etc.

American Practical Navigator is a large book consisting of two parts. Part I contains instructions in navigation and piloting, and in part II are the tables used in connection with these subjects.

Useful Tables is a smaller volume supplied to naval vessels which contains only part II of Bowditch, and is much handier for the navigator's use in working navigational problems.

Among the tables the following are mentioned as being of help to the quartermaster.

1. Table 5-B—Distance of an object by two bearings.
2. Table 6—Distance of visibility of objects of different heights.
3. Table 32—True force and direction of wind.
4. Table 33—Distance by vertical angle.
5. Table 35—Speed table for measured mile.
6. Table 50—Conversion of arc and time.

American Nautical Almanac, a pamphlet, is published annually by the United States Naval Observatory at Washington, D.C., and is of importance to the navigator. It contains data for the sun, stars and planets which are indispensable to the navigator in fixing the ship's position on the high seas when out of sight of all landmarks.

Navigation Tables for Mariners and Aviators are tables designed to facilitate the navigation of aircraft and surface craft. They are used with the *Nautical Almanac* and no other books are required.

Dead Reckoning Altitude and Azimuth Table are tables designed to shorten navigational computations and are used only with the *Nautical Almanac.*

Tables of Computed Altitudes and Azimuths are the latest improved tables for shortening navigational computations. These tables are of particular value to aviators.

Correction of sailing directions and other publications.—Sailing directions are corrected to the date stamped on the inside of the cover. Subsequent corrections should be obtained from the *Notices to Mariners* and pasted on the pages referred to. In the early part of each year a supplement is published to each book and forwarded without request to all Naval vessels in commission. These supplements include corrections from *Notices to Mariners* and other available sources to January 1 of the year issued and supersede all corrections previous to that date. If the book in the hands of the navigator has been corrected from the previous supplement, it is only necessary to use the new matter in the latest supplement. This new matter is indicated by bold-faced type.

The lists of lights and fog signals are published at intervals of about 1 year. New editions are advertised in the *Notices to Mariners* and in the Hydrographic bulletins. They are corrected to date when issued to Naval vessels and subsequent corrections may be obtained from the *Notices to Mariners.*

Errors in any of the Hydrographic Office publications which are dangerous or misleading are published as soon as discovered in the *Notices to Mariners.* These corrections should be entered at once in the books to which they refer.

A complete file of the *Notices to Mariners* must be kept. One of the two copies issued should be preserved unmutilated and pasted in the binder which is furnished for that purpose.

Pilot Charts.—The following are issued by the Hydrographic Office:

1. *Pilot Chart of the North Atlantic Ocean.* (Monthly.)
2. *Pilot Chart of the North Pacific Ocean.* (Monthly.)
3. *Pilot Chart of the Indian Ocean.* (Monthly.)
4. *Pilot Chart of the South Atlantic Ocean.* (Monthly.)
5. *Pilot Chart of the South Pacific Ocean.* (Monthly.)
6. *Pilot Chart of the Central American Waters.* (Monthly.)
7. *Pilot Chart of the Upper Air, North Atlantic.* (Monthly.)
8. *Pilot Chart of the Upper Air, North Pacific* (Monthly.)

These charts are extremely useful and are much in demand. They serve to place immediately before the navigator a complete review of the area which he may have to cover, and thus give in graphic form available facts or conclusions from hydrography, navigation and meteorology that will assist the mariner to choose the safest and quickest routes. Their principal features are: average winds, currents, barometer, percentage of gales, calms, fog, presence of ice and derelicts, radio compass and other signal stations, lines of equal variations of the compass and routes for steamers and sailing vessels. The back of the chart is frequently used to explain pertinent subjects, such as new methods of navigation or a new handy table.

The quartermaster should get an old pilot chart from the navigator, as it will materially assist him in his studies.

Reprints of hydrographic information are pamphlets designed to keep in handy form articles and information scattered through the pilot charts and bulletins. Obtainable at the Hydrographic Office or its branch offices.

INSTRUMENTS

Compass.—*The gyrocompass.*—The gyrocompass, as the name implies, is a compass which depends upon the action of a gyroscope to fix direction. The north point of the card points to the Geographic North Pole of the earth; in other words, it indicates true north. The gyroscope in a gyrocompass is a heavy wheel which is caused to revolve at a high rate of speed (about 8,000 revolutions per minute) by an electric motor.

The gyrocompass or "master," as it is called, is, on large vessels, installed far below the water line. Repeater compasses or "repeaters," as they are called, are installed at the various steering stations, in peloruses and wherever needed in the ship. The repeater is essentially a compass card connected electrically to the master compass and shows the same reading as the card of the master compass.

Gyrocompasses are installed on capital ships, cruisers, submarines, destroyers and large auxiliary vessels. On major ships two master compasses are installed.

Before getting under way, the repeaters are set to read the same as the master compass. While underway the repeaters are checked with the magnetic and the master compasses every half hour and the results recorded in a book provided for this purpose. In checking, the word "mark" is given at a time when the ship is steady on some heading regardless of whether it is an even degree. A check is not a true one if the ship is swinging.

Magnetic compass.—The compass, with its bowl, is placed in a binnacle, or a little compass house. In the binnacle are magnets and two iron balls which are used to neutralize the magnets of the ship, so that the compass will point to the earth's magnetic pole. Now the iron on the ship is riveted in place and the compass can be corrected for the magnetism in this iron. But what will happen if you come up to take the wheel with a jackknife or a bunch of iron keys in your pocket? This knife and any iron you have in your pockets will be magnetic and will draw the compass away from the true magnetic north. Your compass will be in error and you may steer the ship onto the rocks. Therefore, never go near the compass with any iron or steel on your person.

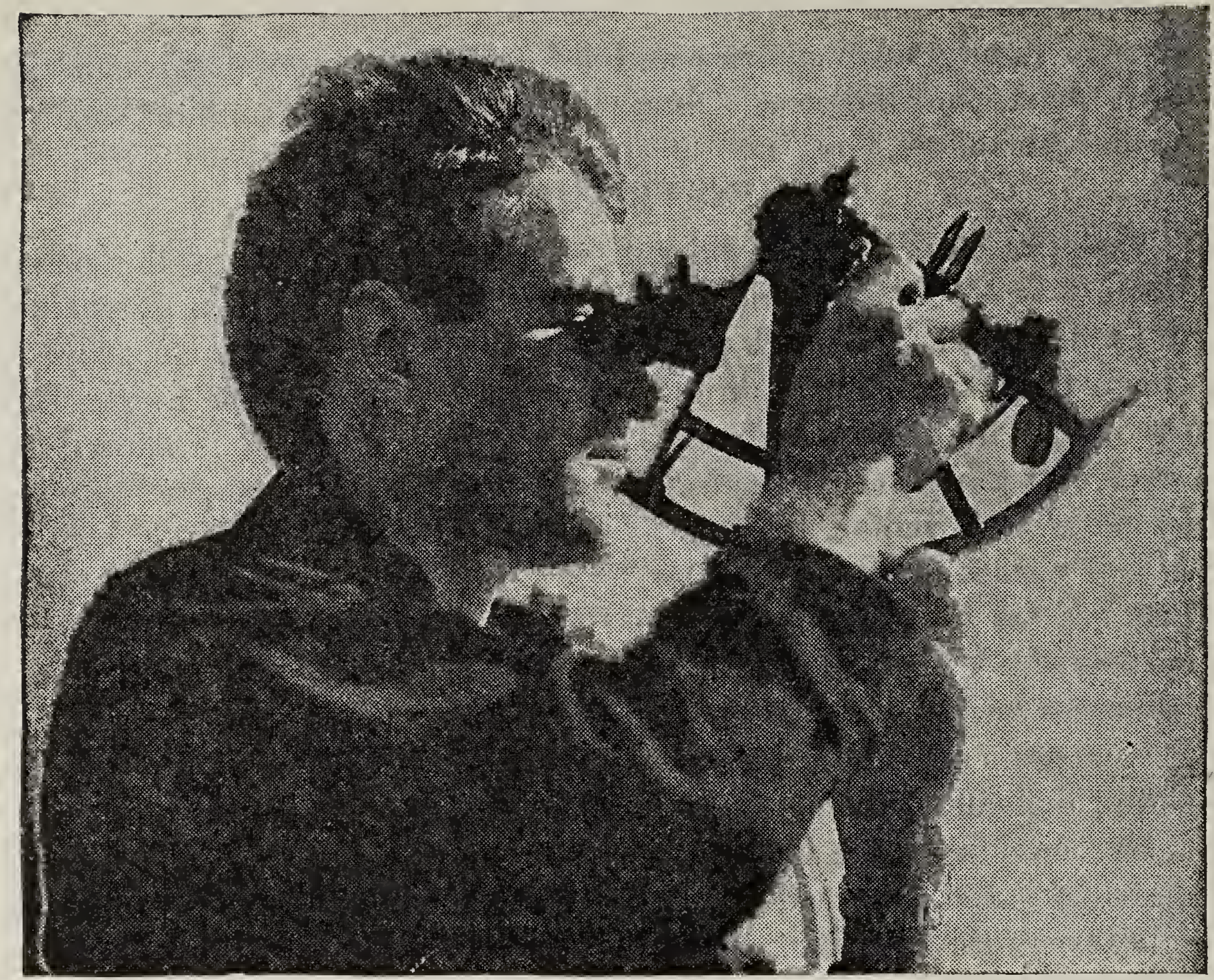


FIGURE 34-5.—Taking a sight with a sextant.

Sextant.—A sextant is an instrument for measuring the angle between two objects, as subtended at the observer's position. It is most frequently used aboard ship for taking sights; that is, measuring the altitude of a celestial body above the horizon; but it is also utilized to take the horizontal angle between surface objects.

The sextant is approximately triangular in shape, and has a skeleton metal frame. This frame carries an arc with a graduated scale, a movable arm, two mirrors, two sets of shade glasses, a telescope retaining ring, a vernier, a handle and a small magnifying glass. The sextant is a delicate instrument which must never be touched, except by authorized persons.

Pelorus.—The pelorus is used on those ships that navigate with the magnetic compass. One of them is located on each wing of the bridge and others may be scattered around at vantage points from which relative bearings may be taken.

The pelorus is a "dummy" compass. Its stand and card carry no magnets, and its card is fixed with its lubber's line parallel with the center line of the ship. With a sighting vane, or azimuth circle, relative bearings may be read from the pelorus, and by applying the bearings to the compass course at the moment, the compass bearing of the object may be obtained. If the starboard bridge pelorus is used the relative bearing is added to the compass course. If the port pelorus is used the relative bearing taken is subtracted from 360 and the remainder is subtracted from the compass reading.

Repeaters used as peloruses.—On ships equipped with gyrocompasses, several repeaters, synchronized with the master gyro, are distributed about the ship at steering stations, fire control stations, etc. Repeaters are used in place of peloruses on these ships.

Chronometer.—A chronometer is a high-grade clock. It is set to keep the time of Greenwich, England, which is in 0° longitude. Greenwich time is used by the navigator in the calculation of his position by sights and it is with the aid of the chronometer that he computes the correct time.

Chronometers are usually swung in gimbal rings in their own boxes, and these boxes are kept together in a special case, a ship usually being furnished at least three chronometers.

Torpedo boat watches are high-grade watches which are sometimes furnished to small ships to take the place of a chronometer.

Clocks.—Deck clocks are under the cognizance of the navigator, but are located in various parts of the ship. A quartermaster who is detailed to wind clocks must be certain that he knows the location of every clock assigned to him, and must wind and set them at regular routine intervals. In winding clocks, the number of turns necessary to wind the clock completely must be ascertained. They should be set to the time of a properly adjusted comparison watch, and the second hands may be made to agree by retarding the motion of the second hand of the clock. Clocks should not be otherwise disturbed.

Stadimeter.—The stadimeter is an instrument used to measure the distances of objects whose heights are known. It measures distances up to 2,000 yards accurately and gives fairly accurate distances up to 10,000 yards. It is used almost continually on the bridge to determine the distance to other ships in a formation. It is delicate and must be handled only by authorized persons.

Rangefinder.—The rangefinder is an optical instrument used to measure the distance to an object. Unlike the stadimeter, its use does not require a knowledge of the height of the object or any other of its characteristics. The small type furnished ships for navigational purposes is usually mounted on a pelorus stand when it is to be used. It is accurate from 1,000 yards to about 6,000 yards and fairly accurate up to 10,000 yards.

Binoculars.—Binoculars, by a system of prisms, accomplish the same adaptation as two telescopes but in a shorter space. Binoculars are handier than telescopes because they are shorter and lighter, and they permit better observation because both eyes may be used.

The power of a glass indicates the amount, expressed in diameters, that the lenses magnify the observed object. This means that a 6-power glass would make the object appear six times as large to the observer as it would appear to him if he were observing the same object with the naked eye, or, disregarding technicalities, the object will appear to be six times as close.

The field of a glass is the space or apparent area within which objects may be seen. The size of the field of a glass is governed by the diameter of the objective lens and its power. Therefore, the two figures given on a glass may be used to determine the power and size of the glass.

The field of a glass decreases in almost the same proportion as the power increases. This means that under conditions where your field of vision would just include an entire ship if you were using a 6-power glass, it would include only a part of the same ship if you shifted to an 8-power glass, but this part would appear larger.

CHAPTER 35

Rules of the Road

PURPOSE OF THE RULES

There is no subject of greater importance to the bluejackets than the rules of the road. The ship and the lives of those on board are endangered when those in charge do not know the regulations. Rules of the road are in effect to prevent collision. They are found in:

1. The International Rules established by agreement between maritime nations.
2. The Inland Rules enacted by Congress to govern navigation in inland waters of the United States.
3. The Pilot Rules which apply to certain harbors, rivers and inland waters of the United States and supplement the Inland Rules.

These rules are mandatory on vessels. Size gives no privilege. The rules apply to sailing vessels, steam vessels and aircraft operating on the water.

PRELIMINARY DEFINITIONS

In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" include any vessel propelled by machinery.

A vessel is under way within the meaning of those rules when she is not at anchor, or made fast to the shore, or aground.

The word "visible" in these rules, when applied to lights, means visible on a dark night with a clear atmosphere.

MAJOR PROVISIONS OF THE RULES

International and Inland Rules are very similar in their provision for comparable situations. Pilot rules are really a part of Inland Rules. In subsequent sections in presenting rules, reference is made to the source.

The rules naturally divide themselves into four groups:

1. Light signals to be used at night
2. Sound signals to be used during the day
3. Steering, and sailing rules
4. Distress signals

Lights and other visual signals to be carried by vessels.—Article 1.—The rules concerning lights should be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited. *(Inland and International Rules.)*

Article 2.—A steam vessel when under way shall carry—

(a) On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, a bright white light . . . so fixed as to throw the light 10 points on each side of the vessel, namely, from right ahead to 2 points abaft the beam on either side, and of such a character as to be visible at a distance of at least 5 miles. *(Inland and International Rules.)*

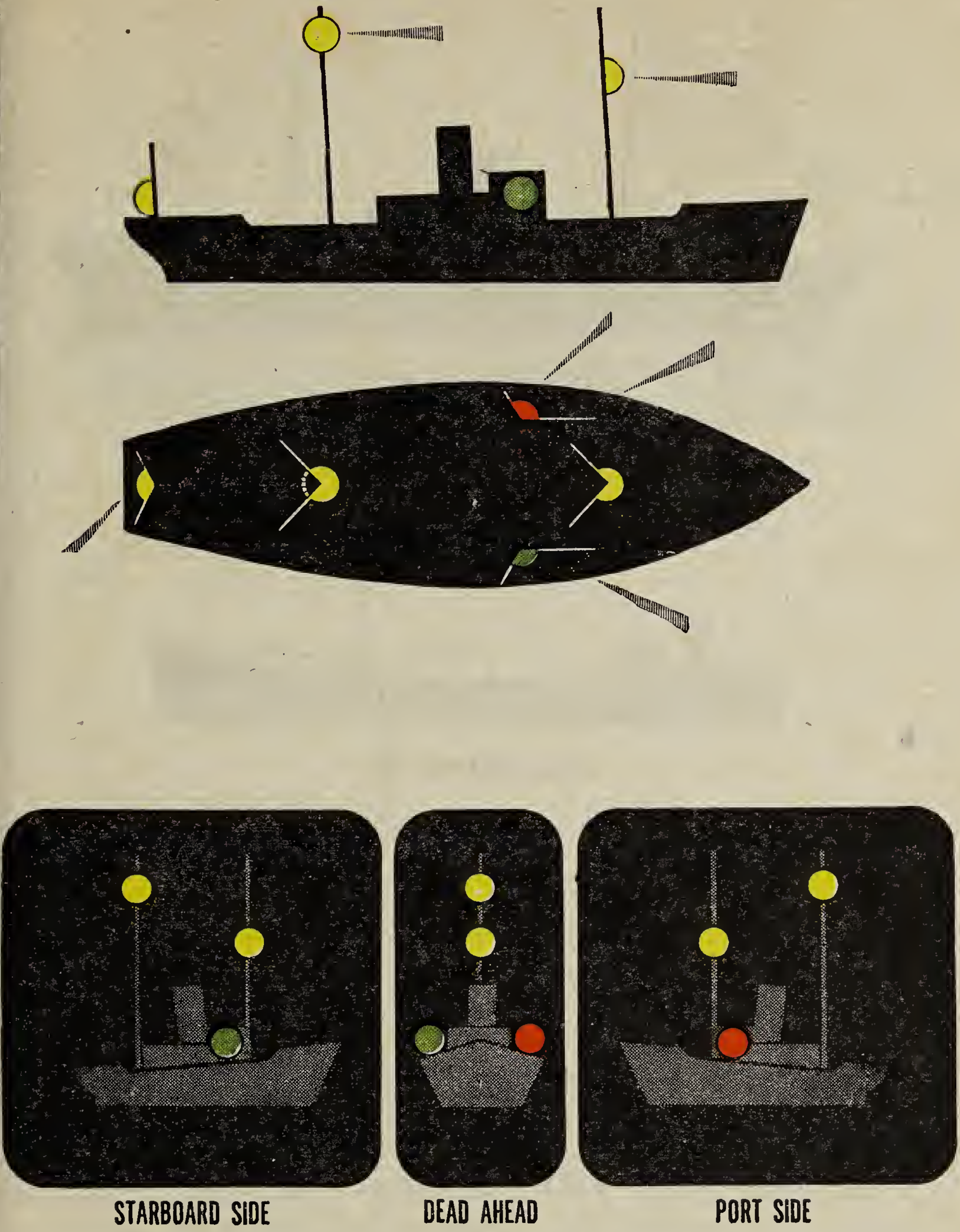
(b) On the starboard side a green light . . . so fixed as to throw the light from right ahead to 2 points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least 2 miles.

(c) On the port side a red light . . . so fixed as to throw the light from right ahead to 2 points abaft the beam on the port side, and of such a character as to be visible at a distance of at least 2 miles.

(d) A sea going steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (a). These two lights shall be so placed in line with the keel that one shall be at least 15 feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. *(Inland and International Rules.)*

Lights for an overtaken vessel.—Article 10.—A vessel which is being overtaken by another, except a steam vessel with an after range light showing all around the horizon, shall show from her stern to the overtaking vessel a white light or a flare-up light. *(Inland and International Rules.)*

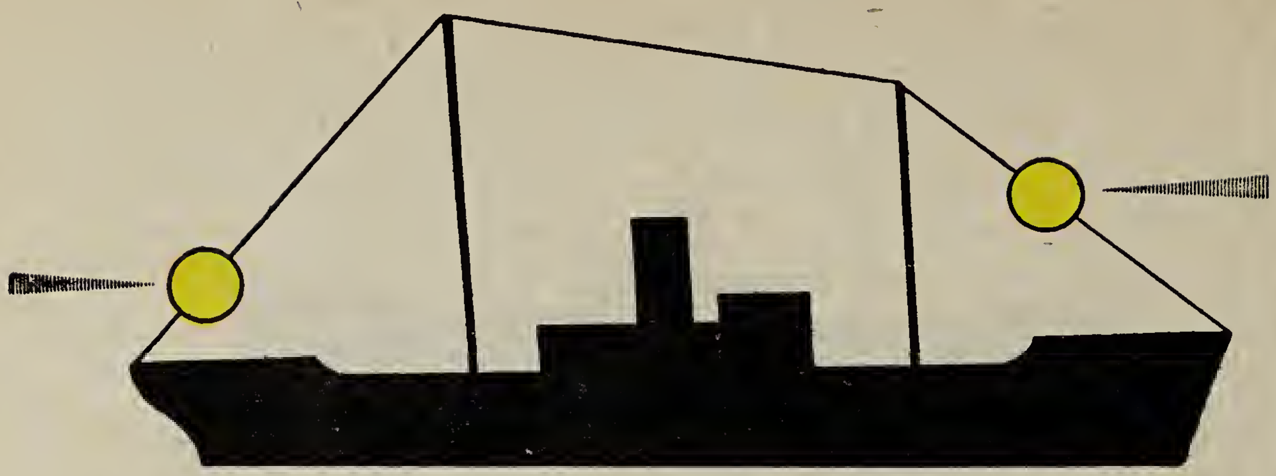
Anchor lights.—Article 11.—A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, . . . a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.



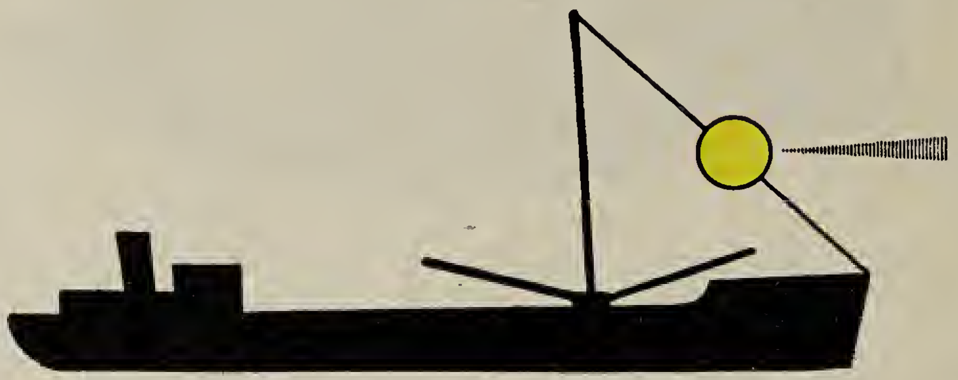
STARBOARD SIDE DEAD AHEAD PORT SIDE

FIGURE 35-1.—Steam vessel under way.

A vessel of 150 feet or upward in length when at anchor shall carry in the forward part of the vessel, . . . one such light, and at or near the stern of the vessel, and at such a height that it will be no less than 15 feet lower than the forward light, another such light. *(Inland and International Rules.)*



VESSEL OVER 150 FEET



VESSEL UNDER 150 FEET

Figure 35-2.—Anchor lights.

Day anchor signal.—Vessels of more than 300 gross tons propelled by machinery when moored or anchored in a fairway or channel where traffic is liable to congestion or confusion shall display, between sunrise and sunset, on the forward part of the vessel where it can best be observed from other vessels, one black ball or shape not less than 2 feet in diameter. *(Pilot Rules.)*

Sound signals.—Article 15.—All signals prescribed by this article for vessels under way shall be given—

1. By "steam vessels" on the whistle or siren.
2. By "sailing vessels" and "vessels towed" on the fog horn.

The words "prolonged blast" used in this article shall mean a blast of from 4 to 6 seconds' duration. . . .

In fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

(a) A steam vessel under way shall sound, at intervals of not more than 1 minute, a prolonged blast. *(Inland Rules.)*

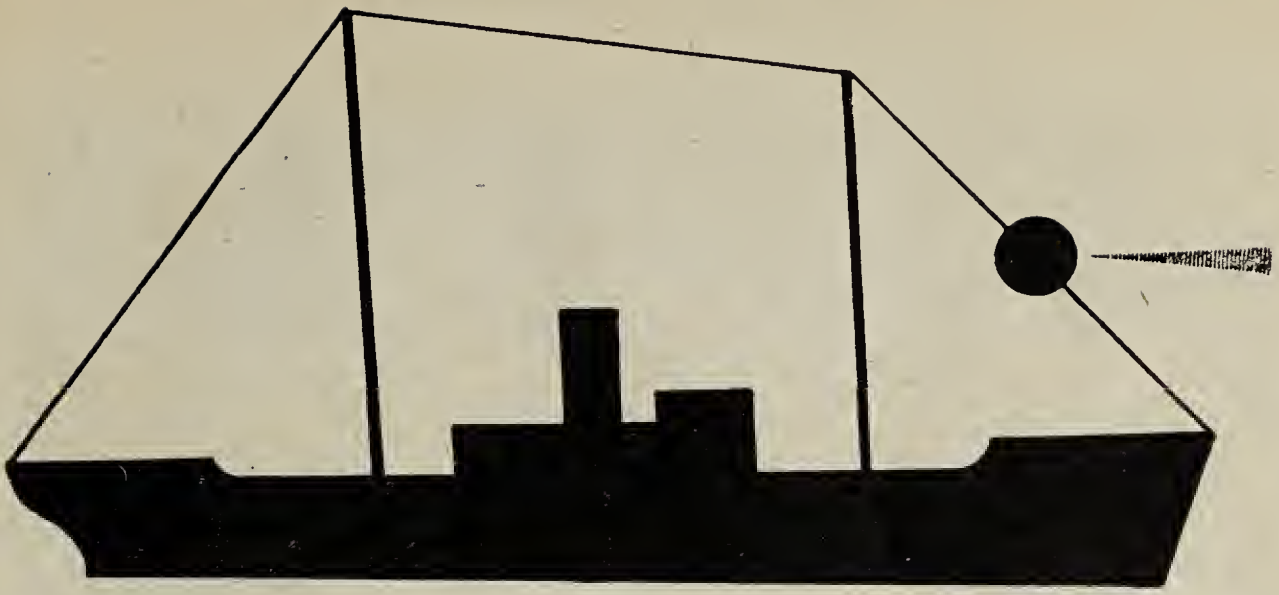


FIGURE 35-3.—Day signal when anchored in fairway.

Speed in a fog.—Article 16.—Every vessel shall, in a fog, mist, falling snow, or heavy rainstorm, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel the position of which is not ascertained shall, so far as the circumstances of the case admit, stop her engines and then navigate with caution until danger of collision is over. *(Inland and International Rules.)*

Steering and sailing rules for steam vessels.—Article 18.—Rule I.—When steam vessels are approaching each other head and head—that is, end on, or nearly so—it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle which the other vessel shall answer promptly by a similar blast of her whistle, and thereupon such vessels shall pass on the port side of each other. But if the courses of such vessels are so far on the starboard side of each other as not to be considered as meeting head and head, either vessel shall immediately give two short and distinct blasts of her whistle, which the other vessel shall answer promptly by two similar blasts of her whistle, and they shall pass on the starboard side of each other. *(Inland Rules.)*

Rule III.—If, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle. *(Inland Rules.)*

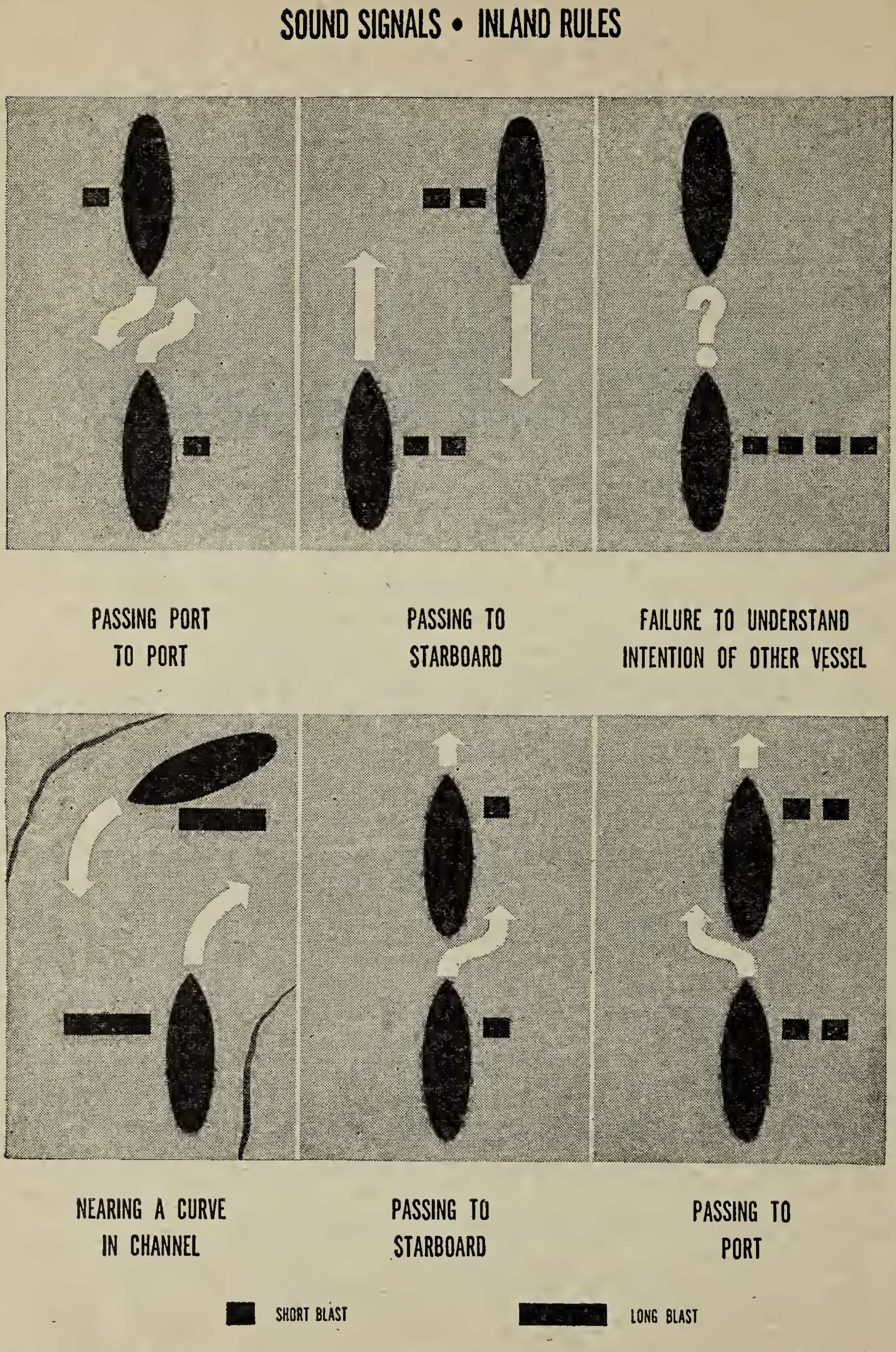

SOUND SIGNALS • INLAND RULES
PASSING PORT TO PORT
PASSING TO STARBOARD
FAILURE TO UNDERSTAND INTENTION OF OTHER VESSEL
NEARING A CURVE IN CHANNEL
PASSING TO STARBOARD
PASSING TO PORT
SHORT BLAST
LONG BLAST

FIGURE 35-4.—Sound signals.

Rule V.—Whenever a steam vessel is nearing a short bend or curve in the channel where, for the height of the banks or other cause, a steam vessel approaching from the opposite direction cannot be seen for a distance of half a mile, such steam vessel, when she shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam whistle, which signal shall be answered by a similar blast given by any approaching steam vessel that may be within hearing. Should such signal be so answered by a steam vessel upon the farther side of such bend, then the usual signals for meeting and passing shall immediately be given and answered. . . .

When steam vessels are moved from their docks or berths, and other boats are liable to pass from any direction toward them, they shall give the same signal as in the case of vessels meeting at a bend but immediately after clearing the berths so as to be fully in sight, they shall be governed by the steering and sailing rules. *(Inland Rules.)*

Rule VIII.—When steam vessels are running in the same direction and the vessel which is astern shall desire to pass on the right or starboard hand of the vessel ahead, she shall give one short blast of the steam whistle as a signal of such desire; and if the vessel ahead answers with one blast, she shall direct her course to starboard; or if she shall desire to pass on the left side of the vessel ahead, she shall give two short blasts of the steam whistle as a signal of such desire; and if the vessel ahead answers with two blasts, shall direct her course to port; or if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the steam whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when said vessel ahead shall signify her willingness by blowing the proper signals. The vessel ahead shall in no case attempt to cross the bow upon the course of the passing vessel.

Two steam vessels crossing.—Article 19.—When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other. *(Inland and International Rules.)*

Steam vessels shall keep out of the way of sailing vessels.—Article 20.—When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel. *(Inland and International Rules.)*

Course and speed.—Article 21.—Where, by any of these rules, one of the two vessels is to keep out of the way, the other shall keep her course and speed. (See Arts. 27 and 29.) *(Inland and International Rules.)*

Crossing ahead.—Article 22.—Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other. *(Inland and International Rules.)*

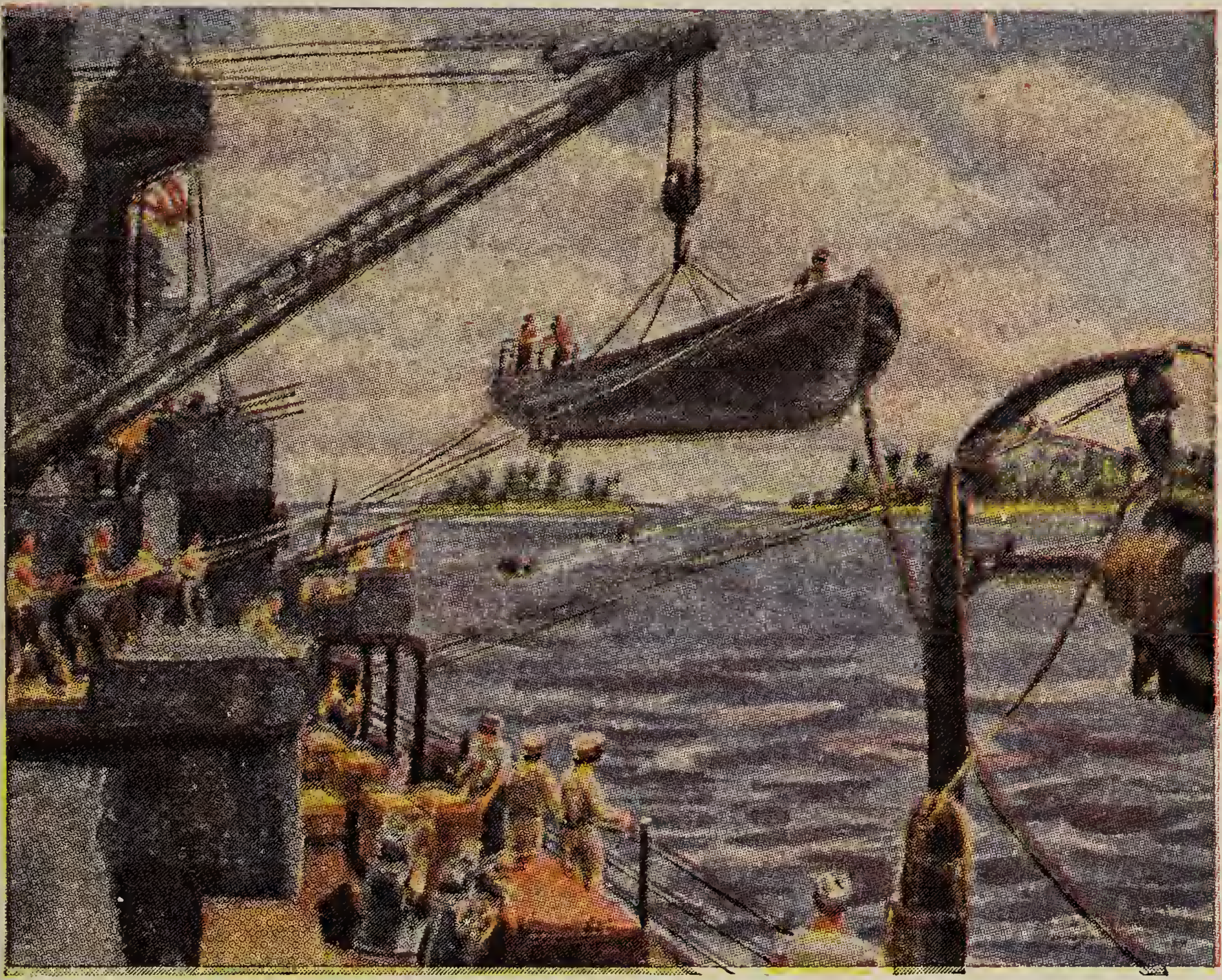
Steam vessel shall slacken speed or stop.—Article 23.—Every steam vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse. *(Inland and International Rules.)*

Overtaking vessels.—Article 24.—Notwithstanding anything contained in these rules, every vessel overtaking any other shall keep out of the way of the overtaken vessel. *(Inland and International Rules.)*

Narrow channels.—Article 25.—In narrow channels every steam vessel shall, when it is safe and practicable, keep to the side of the fairway or mid-channel which lies on the starboard side of such vessel. *(Inland and International Rules.)*

General prudential rule.—Article 27.—In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger. *(Inland and International Rules.)*

Precautions.—Article 29.—Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case. *(Inland and International Rules.)*



PART 8

DECK SEAMANSHIP

CHAPTER 36

Marlinspike Seamanship

Marlinspike seamanship deals with line and the methods of working it, such as knotting, splicing and seizing. Line includes small cordage, fiber line and wire line.

Line is made from Manila, hemp (tarred and untarred), cotton, flax and wire. However, the use of hemp, cotton, and flax line is limited.

FIBER LINE

Fiber line includes that made of Manila, hemp, cotton and flax. It derives its name from the fact that it is made from plant fibers.

Manila is made from the abaca plant, and comes principally from the Philippines. Its use is general and most of the lines seen on board ship are of Manila. Manila line is frequently known as Manila hemp, but there is a great difference between it and "hemp," and seafaring men should not confuse the two.

Hemp is made from the hemp plant, which is most extensively raised in Italy, Russia and the United States. American hemp is used for making lines used in the United States Navy.

Hemp line is only seen as "small stuff" in the United States Navy, and is seldom used on merchant ships, except for standing rigging not made of wire, and then it is invariably tarred. Tar reduces the strength of the rope, but increases its life by protecting it from moisture.

Cotton and flax lines are made of ordinary cotton and linen, respectively. In large sizes they are unsuitable for service aboard ship. Cotton line is used for such things as the taffrail log, lead lines, and signal halyards. Flax line is used for boat lead lines. These ropes are frequently braided instead of being laid.

Small cordage.—Small cordage is usually known on shipboard as "small stuff," and designated either by the number of threads that it contains, such as "12-thread stuff," "15-thread stuff," "24-thread stuff," or as "ratline stuff," "seizing stuff," or "marline."

These are tarred hemp and are measured in some cases by the fathom, in other cases by the pound.

In addition to being described by the number of threads, different types of small stuff have specific names. The following are the most common varieties.

1. *Spun yarn* is rough and comparatively cheap. It is loosely laid up and left-handed, of 2, 3 or 4 strands. This is the most extensively used small stuff, being convenient for seizings, and service where great neatness is not required. It is tarred.

2. *Marline,* 2-stranded, left-handed, has the same uses as spun yarn, but is used where neater work is required. Yacht marline, tarred, is used for small work in rigging lofts. Untarred marline is used for sennit, a braided cord or fabric made of the plaited yarns.

3. *Houseline* and *roundline* have the same uses as marline, the difference being that they are 3-strand. Houseline is left-handed and roundline right-handed.

4. *Seizing stuff* is used where a heavier, stronger and neater material than any of the above is needed. It is laid up by line-making machines and is finished like larger line. It is usually 3-strand, right-handed stuff, and may have 2, 3 or 4 threads to the strand, making 6-, 9- or 12-thread seizing stuff. Tarred American hemp is the standard material used in making it.

5. *Ratline stuff* differs chiefly from seizing stuff in that it is larger, being issued in sizes from 6 to 24 thread, such 6-thread, 9-thread or 12-thread.

6. *Rope yarns,* made by unlaying condemned tarred hemp cordage, are very convenient for miscellaneous light rough work. Foxes, two yarns twisted by hand or a single yarn twisted against its lay and rubbed smooth, make neater seizings than spun yarn. A good supply of rope yarn should be kept on hand.

Size of fiber line.—The size of fiber line, except small stuff, is specified by the number of inches in its circumference. Thus, a 6-inch Manila line is made of Manila and is 6 inches around. It is made in sizes from ¾ inch to 16 inches, but 10 inches is the largest standard size issued to the United States Naval Service, and 8-inch is the largest size commonly seen.

The length of fiber line is given in fathoms, and it is issued in coils of 100, 120, 150 or 200 fathoms, dependent upon the size and type of line. American hemp, tarred, boltline, is the only one issued in 100-fathom lengths, and no line of any size larger than 2¼ inches comes in 200-fathom coils.

The specifications for standard line which may be ordered show the type, size, weight in pounds per fathom, length of coil, weight of coil and breaking strain.

Care of fiber line.—Unlike metal, fiber has not a permanent elastic limit within which it can be worked indefinitely. Therefore, no attempt should be made to put a maximum strain on a line which has once been close to the breaking point. The safety of a line decreases comparatively rapidly with use, dependent to some extent upon the amount of strain. This is due to the fact that the fibers slip a small amount under each strain in spite of the twisting.

Line shrinks in length when wet and, unless allowed to shrink freely, subjects itself to a strain as great or greater than it would carry under a load. For this reason, lines which are belayed should be slacked when wet; otherwise, they will be weakened or even broken if they were very taut when dry.

Line deteriorates quickly if allowed to remain damp. It should not be stowed unless perfectly dry, nor should it be covered in such a way that the moisture will be held in.

Hemp and Manila lines are lubricated when received. From 10 to 12 per cent of the weight is made up of oil which has been sprayed on. This assists in protecting the rope from excessive heat and moisture. As the oil is lost the tendency of the rope to deteriorate increases. Rope is quite an item of expense on board ship, and a great deal should be saved by care taken in handling it.

Care of fiber rigging.—Running rigging must always be slacked up in wet weather, as rope shrinks in length when wet and the rigging may become so taut as to part or carry something away. All running rigging should be slacked off at night as dew is sometimes heavy enough to soak the lines thoroughly.

Smoke-pipe guys should be slacked off when fires are lit off under the boilers to which the smoke pipes lead, as heat from the fires causes the smoke pipe to expand considerably.

Standing rigging is protected from the weather with a coating of tar oil and coal tar. The coating must be renewed at regular intervals.

All rigging must be gone over at frequent intervals to make sure that no part of it is deteriorating.

Knots.—Knots are divided into four general classes. These classes are as follows.

1. Knots in the end of a line. These are for fastening a line upon itself or around some other object.

2. Knots for bending two lines together.

3. Knots for securing a line to a ring or spar. These are called hitches or bends.

4. Knots worked in the end of a line. These are fancy knots which finish off the end of a line and also prevent its pulling through a ring. They are usually used on bell lines, or hand lines.

Class 1.—The following knots are made with the end of a single line:

1. Overhand Knot—used in making other knots; never used alone.

2. Bowline—used whenever you want a knot that will not slip.

3. Running Bowline—bowline made around the standing part.

4. Bowline on a Bight—used to sling a man over the side.

5. Cat's Paw—a double loop formed by twisting two bights of a line.

6. Sheep Shank—used to shorten a line.

7. Figure of eight—put on end of line to prevent end from unreeving through a block or eyebolt.

8. Blackwall Hitch—used for securing hook to bight of line quickly.

9. French Bowline—similar to a regular bowline used in sending a man over the side.

Class 2.—The following knots are used for bending two ropes together:

1. Square or Reef Knot—used for tying reef points and bending lines together.

2. Granny Knot—unseamanlike knot made instead of a square knot by a green hand.

3. Sheet or Becket Bend (Single)—used for bending line to becket.

4. Sheet or Becket Bend (Double)—used for bending line to becket.

5. Single or Double Carrick Bend—these are similar to the sheet bends, but are seldom used. If they are used, it is best to stop the ends down.

6. Two bowlines—a safe and convenient way of bending two hawsers together.

7. Reeving Line Bend—a method of bending two lines together, but not adaptable to quick work. It will reeve through a block.

Class 3.—The following knots are used for securing a line to a ring or spar:

1. Studding Sail Tack Bend—a useful bend for a variety of

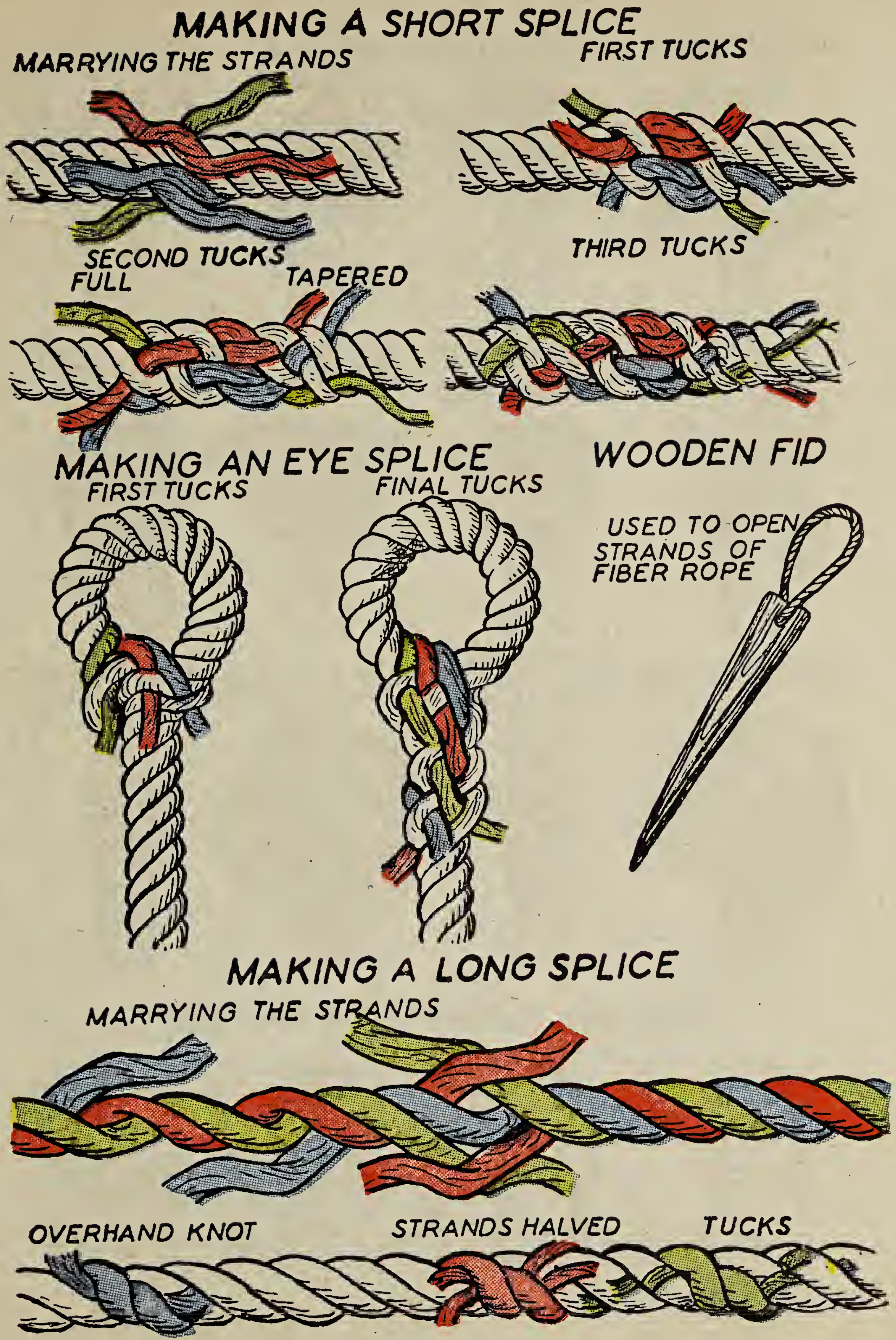


FIGURE 36-1.—Splicing fiber rope.

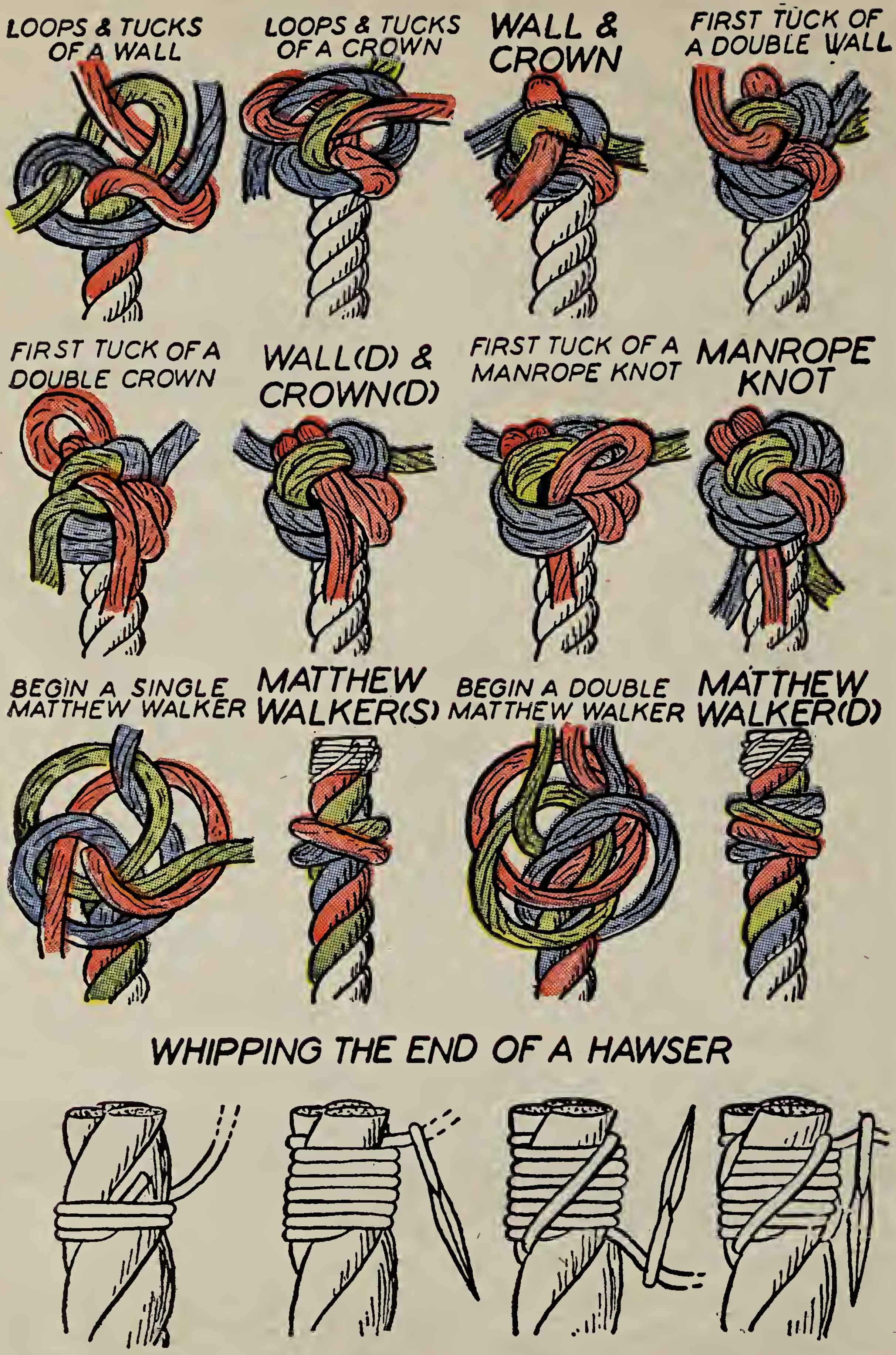

LOOPS & TUCKS OF A WALL
LOOPS & TUCKS OF A CROWN
WALL & CROWN
FIRST TUCK OF A DOUBLE WALL
FIRST TUCK OF A DOUBLE CROWN
WALL(D) & CROWN(D)
FIRST TUCK OF A MANROPE KNOT
MANROPE KNOT
BEGIN A SINGLE MATTHEW WALKER
MATTHEW WALKER(S)
BEGIN A DOUBLE MATTHEW WALKER
MATTHEW WALKER(D)
WHIPPING THE END OF A HAWSER

Figure 36-2.—Ornamental and practical means to keep a rope end from unlaying.

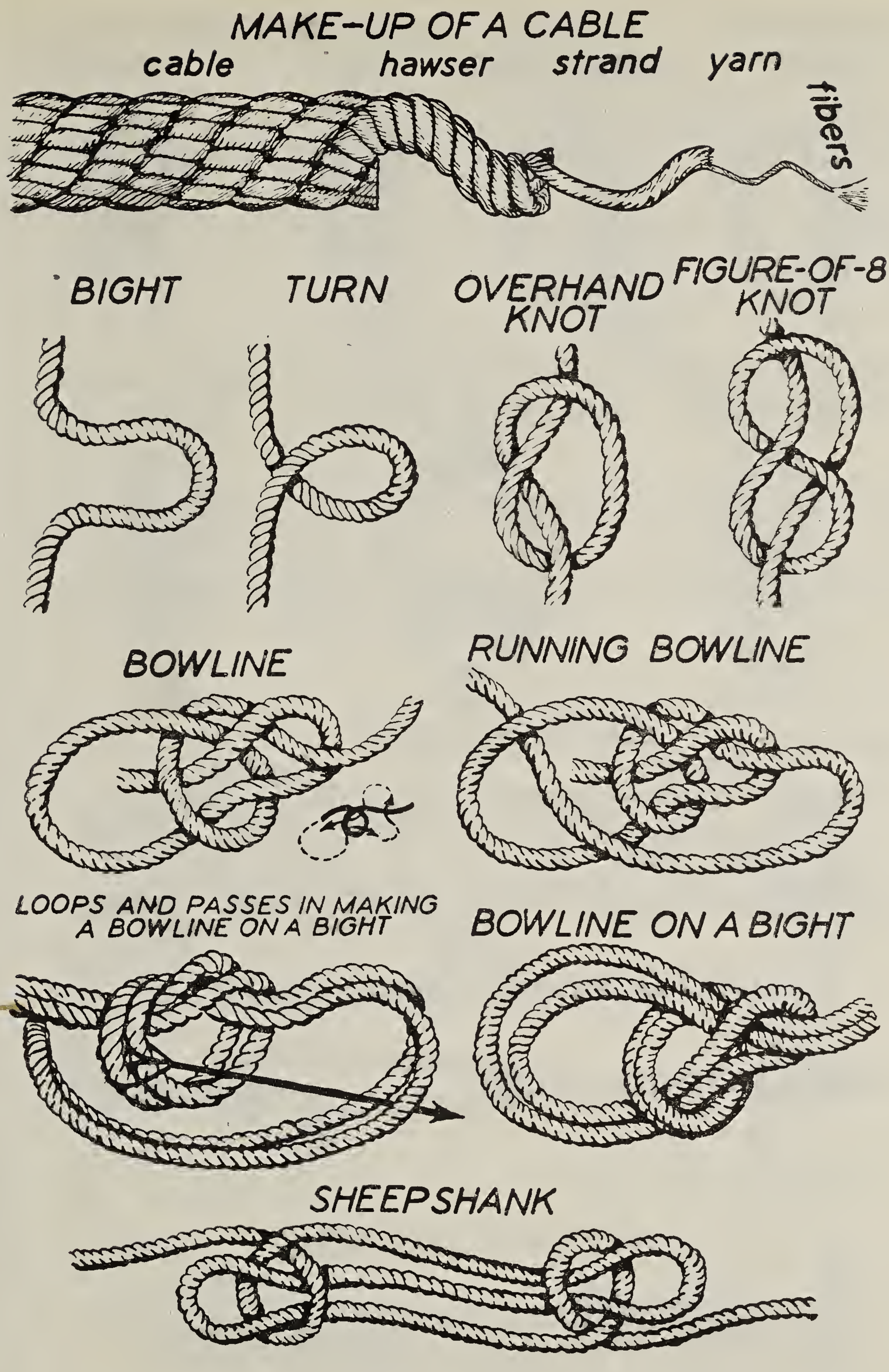


FIGURE 36-3.—Rope structure, knots tied with an end or a bight.

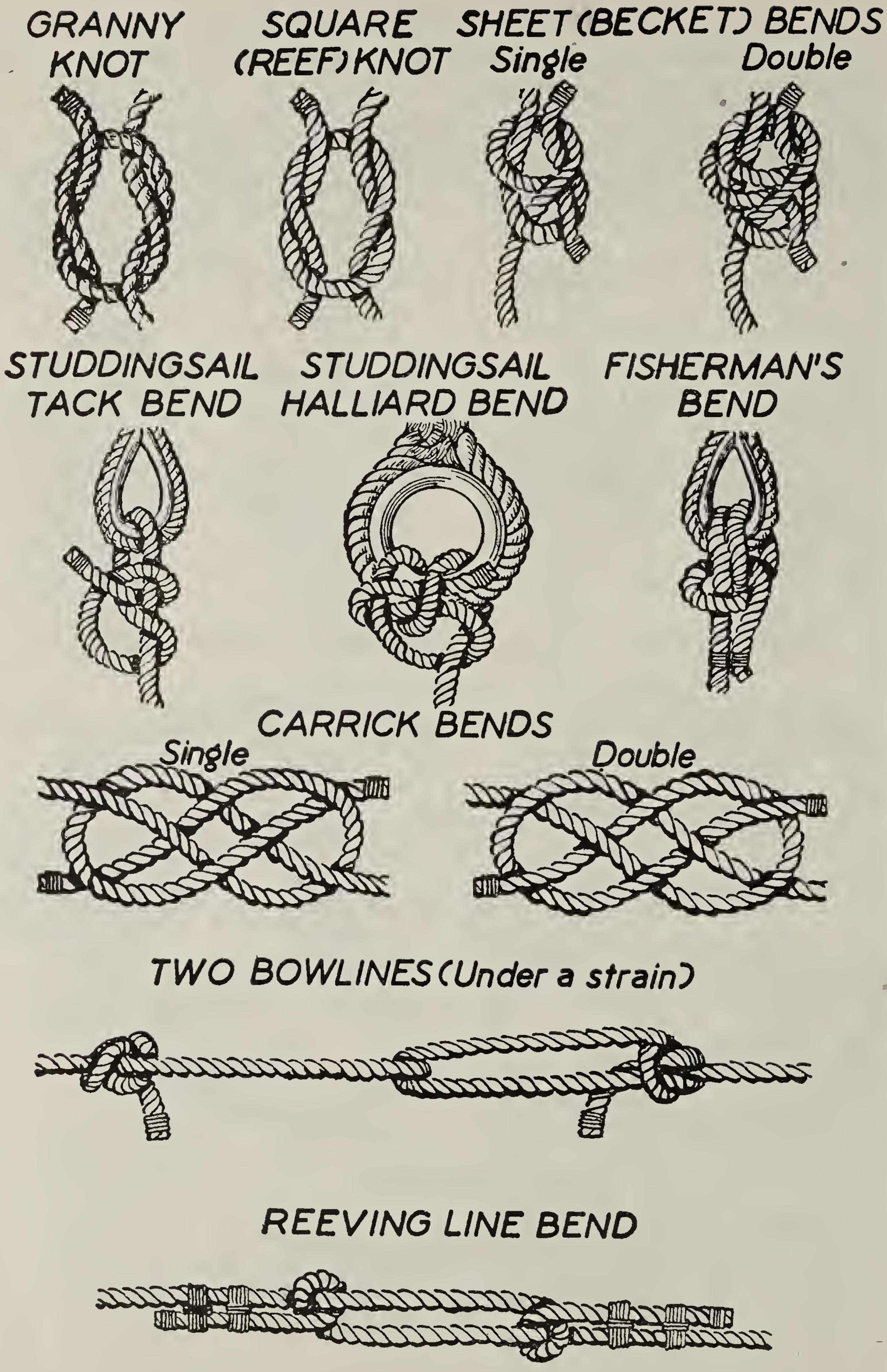


FIGURE 36-4.—Bends.

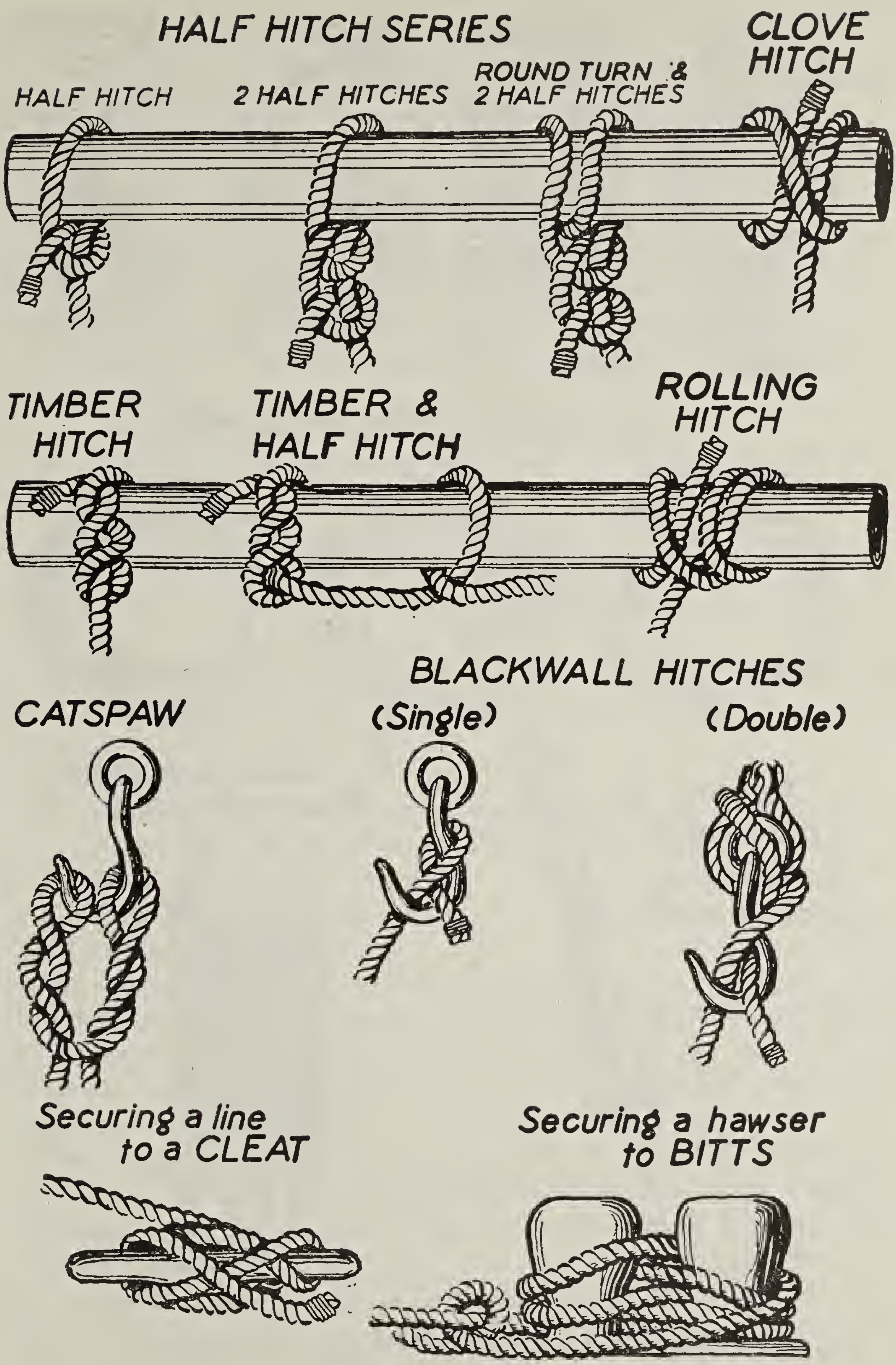


FIGURE 36-5.—Hitches.

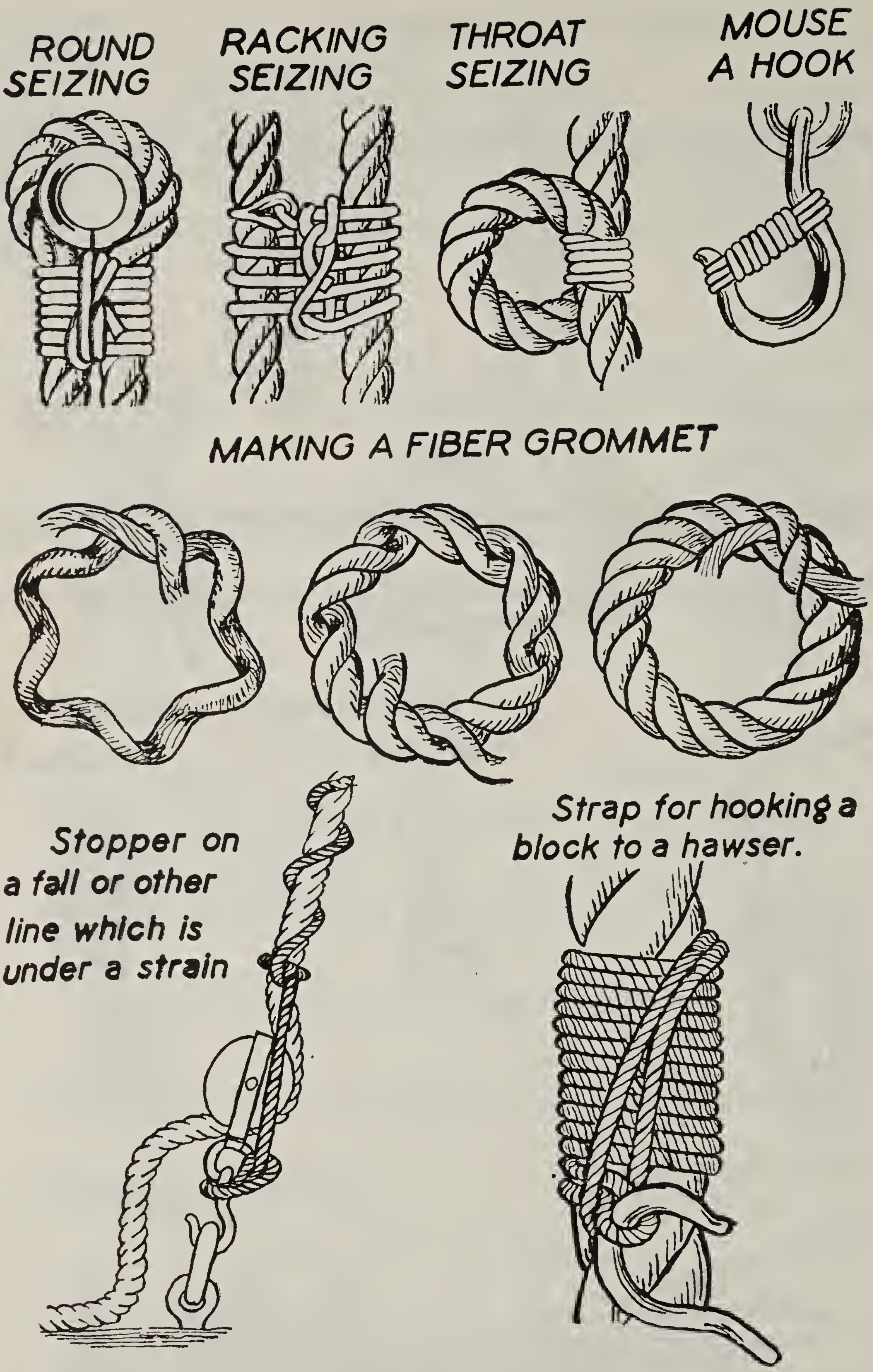

ROUND SEIZING
RACKING SEIZING
THROAT SEIZING
MOUSE A HOOK
MAKING A FIBER GROMMET
Stopper on a fall or other line which is under a strain
Strap for hooking a block to a hawser.

FIGURE 36-6.—Miscellaneous methods of securing.

purposes where it is important to have no danger of coming adrift through the flopping of a sail.

2. Studding Sail Halliard Bend—a bend which will not easily come adrift. The greater the pull the more tightly it is jammed.
3. Fisherman's Bend—used for securing a rope to a buoy, or a hawser to the ring or Jew's harp of an anchor.
4. Timber Hitch—used for towing spars.
5. Timber Hitch and Half Hitch—used same as Timber Hitch.
6. Rolling Hitch—used in bending a line to a spar or to the standing part of another line.
7. Round Turn and Two Half Hitches—used for bending a line to an anchor.
8. Two Half Hitches—used as a half hitch.
9. Clove Hitch or Ratline Hitch—used for fastening ratlines to shrouds.
10. Stopper on a Line—a short length of line secured at one end, and used in securing or checking a running line.
11. Marline Hitch—used in lashing hammocks, securing sails to spars.

Class 4.—The following knots are used to give a finish to the end of a line, prevent unreeving, or for ornamental purposes.

1. Wall Knot
2. Wall and Crown
3. Double Wall and Single Crown
4. Double Wall and Double Crown or "Man-rope Knot"
5. Mathew Walker Knot
6. Whipping the end of a line
7. Sailors Whipping

Splicing.—Splicing is a method of permanently joining the ends of two lines or of bending a line back on itself so as to form a permanent loop. If properly done, it does not weaken the line, and a splice between two lines will run over a sheave or other object much better than a knot.

There are various forms of splices: the long splice, short splice and eye splice. Splicing may be done with either wire or fiber line, but wire line is obviously harder to handle and is discussed in a succeeding section.

For a short splice, both ends of line are unlaid for about a foot and the strands are interlaced, as shown in the drawing on page 409. Beginning with any one strand, it is tucked from left to right, the lay of the line being opened by a marlinspike, wooden fib, or some other pointed instrument. The other two strands are similarly tucked, but from right to left. Threads are then cut away from the ends of each tucked strand until they are two-thirds their original size, and they are then again tucked. After this, the strands are similarly cut away until they are one-third their original size, and a third and last tuck is taken. This produces a neat, tapered splice.

In splicing 4-stranded line, the first strand is tucked under two parts on the first tucking only.

An eye splice is done by the same method, except that the line is first brought back upon itself enough to give the desired size of eye, and the strands are then tucked into the body of the line.

For a long splice the ends are unlaid farther than for a short splice and are then similarly interlaced. However, the procedure from then on is different and is as follows:

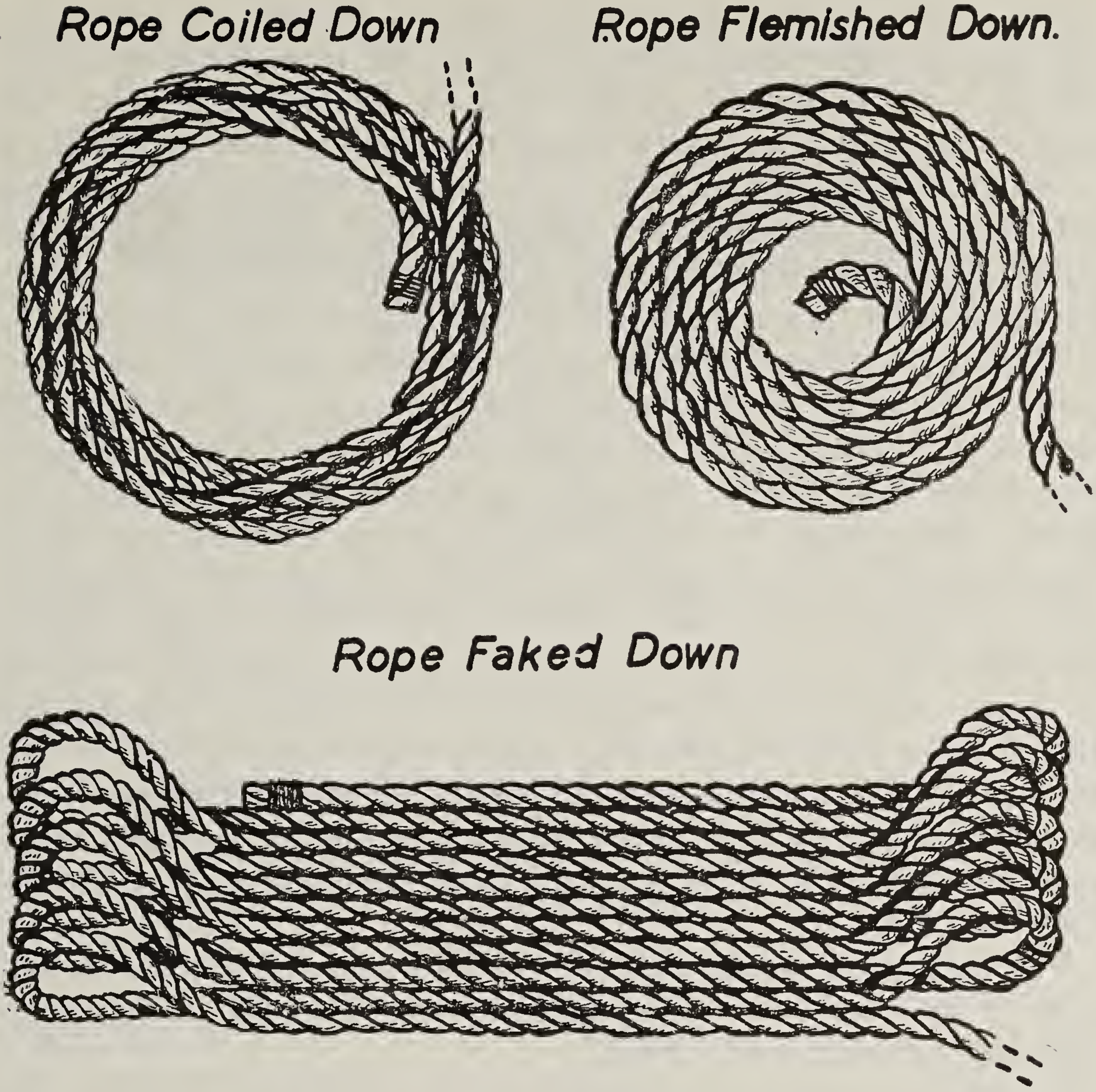
A strand of one piece is unlaid for quite a distance, and the corresponding strand of the other piece is laid in the opening. The remaining ends of the two strands are twisted together for convenience, the line is turned end for end, and the first operation repeated with two other corresponding strands.

The remaining strands of each part are left at the original position. This leaves pairs of strands at three positions along the line. Each of these strands is halved, two of these halves at each position are tied together with an overhand knot, and the remaining two halves are tucked over one and under one of the full remaining strands of the line. After all strands have been tucked, the loose ends are all trimmed off smooth. By this method a splice is secured which will run over a sheave easily and which is hardly noticeable.

Seizing.—Seizing is the process or operation of lashing two parts of line together by continuous turns of small stuff. The seizing is then secured by a clove or other type of hitch. When two crossing parts of line are bound, the seizing is a throat seizing.

Seizings are used in assisting to hold a line loop around a thimble, retaining a loop in the center of a line, holding the short end of a hitch or bend to the main body of the line, or fastening two sister hooks together.

Coiling down line.—The ends of running rigging not in use or led out for use should never be left in any but one of the coiled conditions: *coiled*, *flemished*, or *faked down*. This makes them neat and



Rope Coiled Down

Rope Flemished Down.

Rope Faked Down

FIGURE 36·7.—Coiling down rope.

seamanlike, prevents fouling, and prepares them for immediate use. If line must be ready for emergency use, as in the case of the falls of a lifeboat which is ready for lowering, it is coiled down. If the entire length must be run out fairly rapidly, it is faked down. If it is not expected that the line will be needed on short notice, it is flemished down for greater neatness.

Uncoiling Manila line.—The following practice with respect to uncoiling new coils of Manila rope should be followed:

Both fag ends of a coil are visible on one face of the coil and this is known as the front of the coil. The opposite face is known as the rear of the coil. On the front of the coil one fag end forms the last turn of the outside layer. The other fag end forms the first turn of the inside layer, and is brought through the hole from the rear of the coil.

The proper method of uncoiling rope is to pull the inside fag end, i.e., the fag end at the inside of the coil, from the front of the coil. The coil is thus in proper position for uncoiling when the front of the coil is face up. By this method the direction of uncoiling is counter to the direction of turn, i.e., turn is taken out of the rope and kinking is avoided. The coil is in an incorrect position for uncoiling when the rear face is up. If an attempt is made to uncoil in this position by pulling the inside fag end, kinking will occur because the direction of uncoiling adds to the turn. The matter of kinking is more serious in the large sizes of line because, when a kink has once formed, it is not possible to restore the distorted strands to their correct position. Tensile strengths of kinked line have indicated that a kinked section may be expected to fail at loads of from 20 to 30 per cent below the strength of a section which has not been kinked.

The location of the inside fag end at the front of the coil, as described above, has not been followed with the smaller sizes, but the inside fag end has been found in its natural position at the rear of the coil. To uncoil the small sizes in which the inside fag end is at an opposite face from the outside fag end and has not been brought through the hole to the front of the coil as in larger lines, reach through the hole of the coil from the front and grasp the inside fag end.

Worming, parceling and serving.—Line which is to be exposed to the weather or to exceptionally hard usage is protected by worming, parceling and serving.

Worming consists in following the lay of the line, between the strands, with small stuff, tarred, which keeps moisture from penetrating to the interior of the line, and at the same time fills out the round of line, giving a smooth surface for the parceling and serving.

Parceling consists in wrapping the line spirally with long strips of canvas, following the lay of the line and overlapping like the shingles on a roof to shed moisture.

Serving consists in wrapping small stuff snugly over the parceling, each turn being hove as taut as possible so that the whole forms a stiff protecting cover for the line. A serving mallet is used for passing the turns; in serving, each turn is hove taut by the leverage of the handle, as illustrated. Remember:

Worm and parcel with the lay,
Turn and serve the other way.

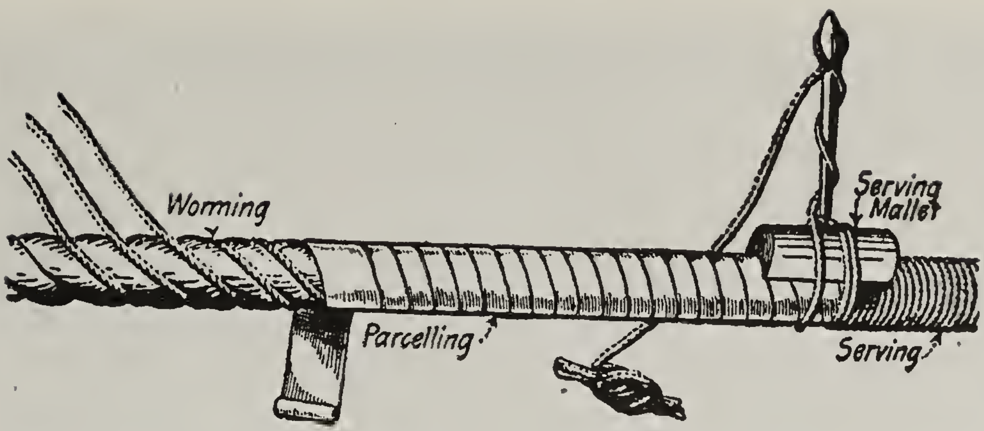


FIGURE 36-8.—Worming, parceling, and serving.

WIRE LINE

Wire line has much in common with fiber line. The terms used to describe its working are practically the same as for fiber line. One essential difference is that no knots can be tied in wire line, making it necessary to employ different methods of securing it.

Navy Department specifications provide for wire line of the following materials and strengths:

Minimum tensile strength (lb. per sq. in.)

Material	*Not Galvanized*	*Galvanized*
Cast steel	170,000	155,000
Extra strong cast steel	190,000	170,000
Plow steel	210,000	190,000
High grade plow steel	230,000	210,000
Phosphor bronze	90,000	

Wire line is also made of corrosion-resisting steel and of special steel having 280,000 lb. per sq. in. tensile strength. The latter is used for long towing lines where both adequate strength and light weight are required.

Wire line is used in the Navy for such things as rigging, towing, pendants, crane falls and wheel lines in small ships.

Size of wire line.—United States Naval specifications designate the size of wire line by the diameter.

The length of wire line is measured in fathoms, as is fiber line. The specifications for wire line show its pattern, diameter in inches, approximate circumference, weight in pounds per fathom, average breaking strength and maximum working load.

To measure accurately the diameter of wire line, it should be

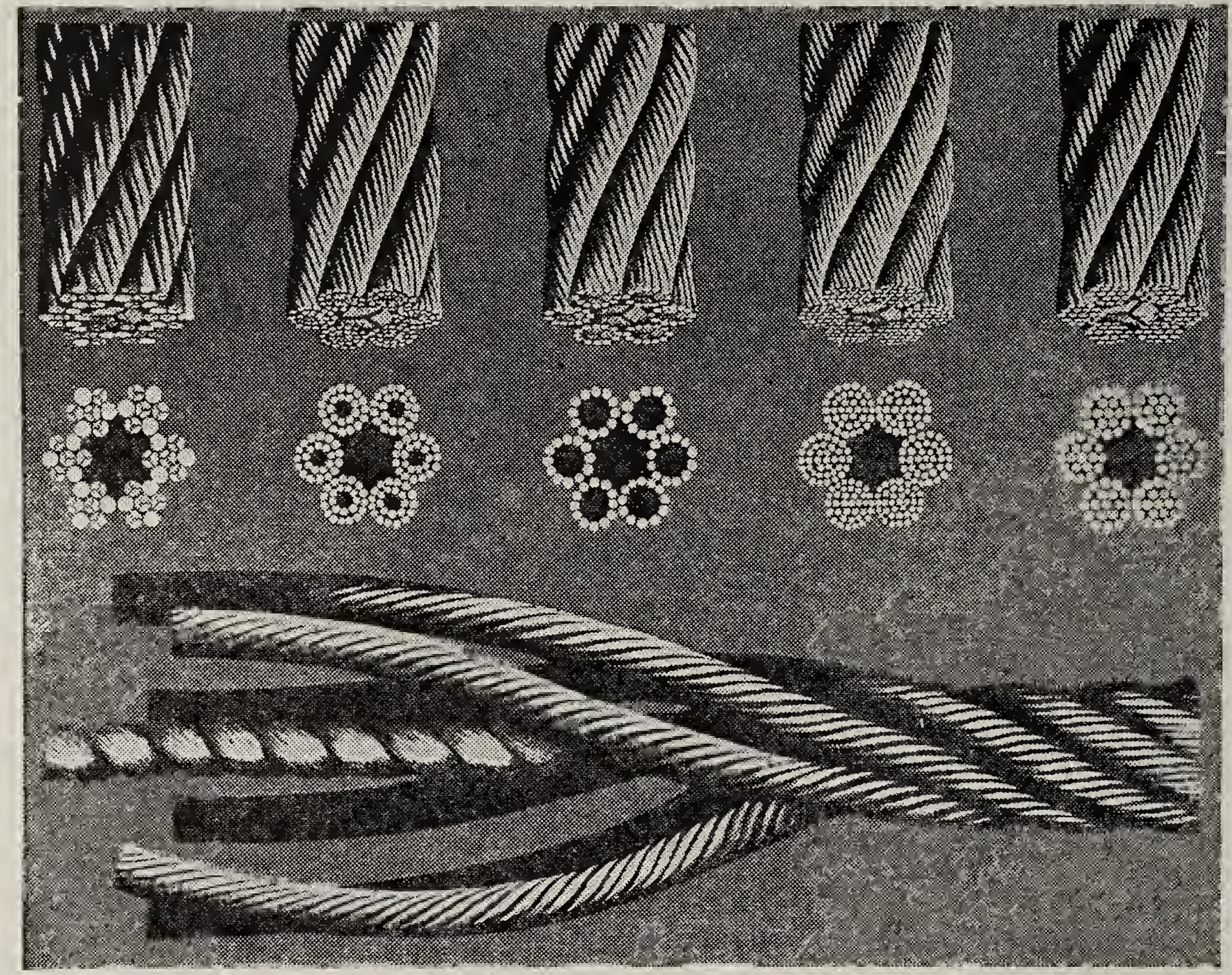


FIGURE 36-9.—Makeup of wire line.

measured with a suitable device such as a machinist's caliper square at places at least 5 feet apart. The average of these diameters is the diameter of the line.

Care of wire line.—Wire line, if anything, requires better care than fiber line.

A kink will ruin the best wire line. For this reason it should always be stowed on reels; it should be unreeled and not removed from a reel in bights; turns should never be allowed to overlap on a drum or winch; it should not be run over pulleys in such a way that it will have a reverse bend, like the letter "S," and it should never have sharper bends than can possibly be avoided, in any type of use. Kinks are easily seen and are a warning of probable weakness of a wire line.

When wire line is used with sheaves, the diameter of the sheave and speed of running are important. Large sheaves and low speeds are best. In any case, the diameter of the sheave should never be less than 20 times as great as that of the line in use, but the score

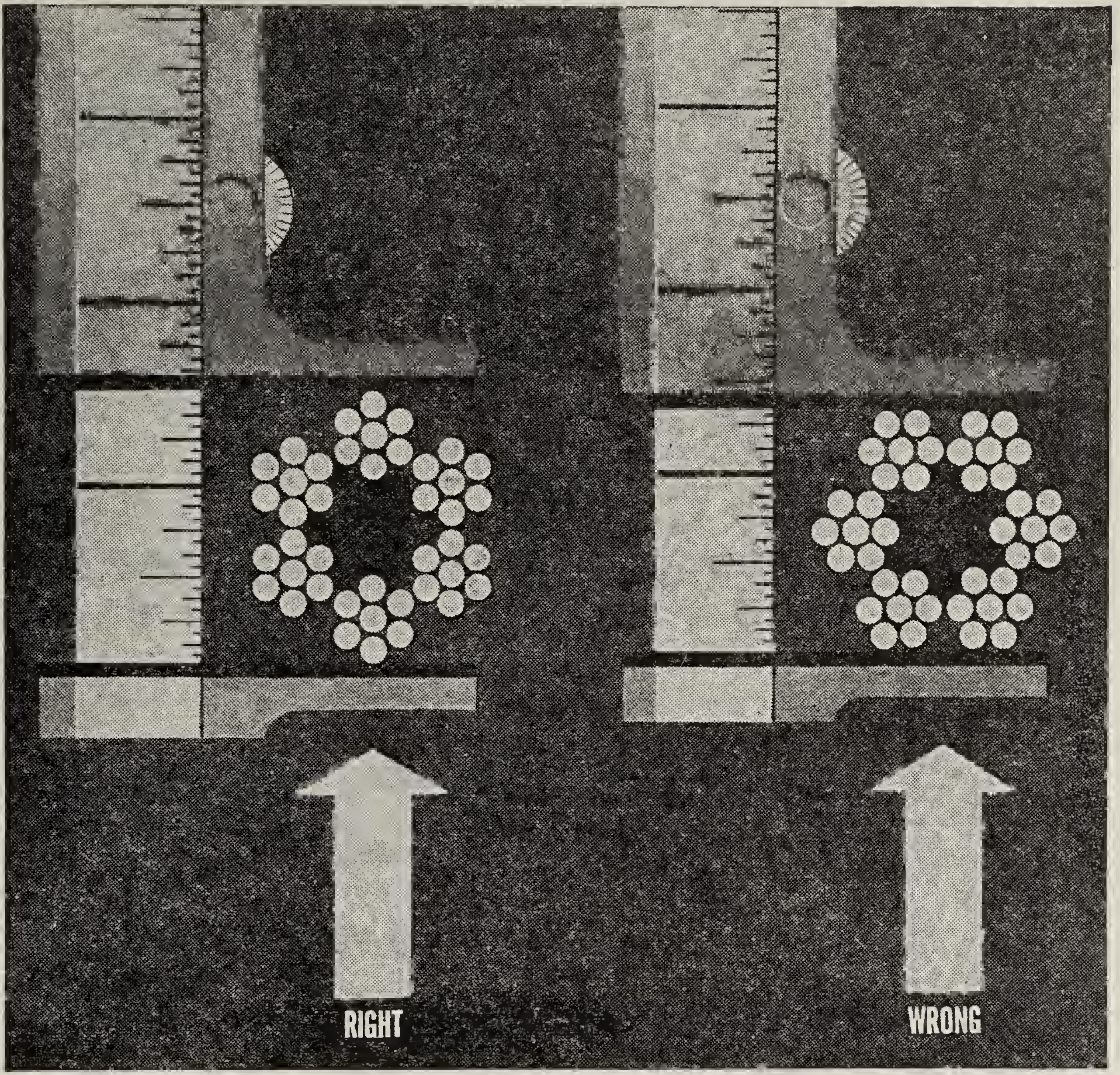


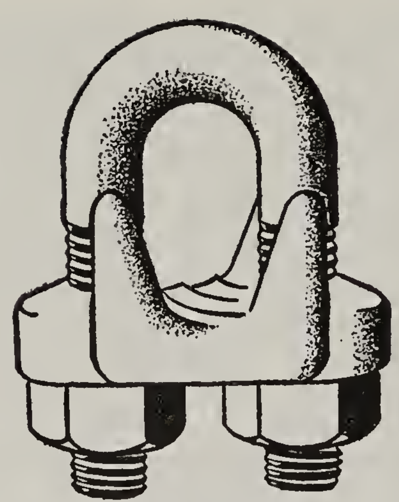
FIGURE 36-10.—The correct and incorrect way to measure wire line.

of the sheave should not be so large as to allow excessive play. The wear on a wire line running over a pulley increases more with the speed than it does with the load, hence it is better to increase the load of each hoist rather than the speed of the crane or winch when in a hurry.

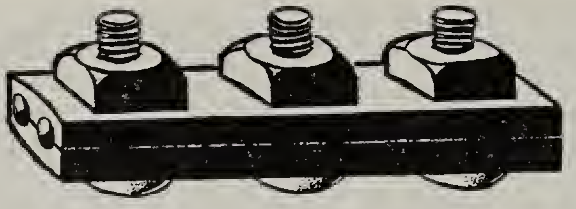
When in use wire line should be thoroughly and frequently lubricated with linseed oil, or with crude oil mixed with lampblack. The lubricant must be thin enough to reach the interior and prevent excessive friction inside.

Wire line should be wrapped with canvas, leather, or other chafing gear where it passes through a chock or any other point that would wear it by rubbing.

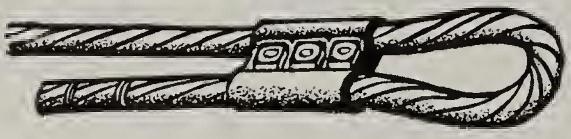
Wire line should not be used when the outside wires are worn



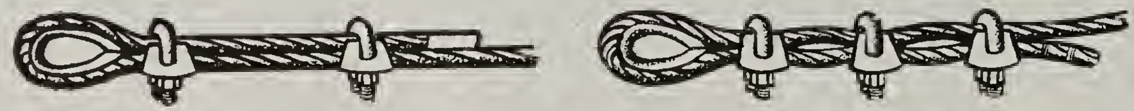
WIRE ROPE CLIP



WIRE ROPE CLAMP



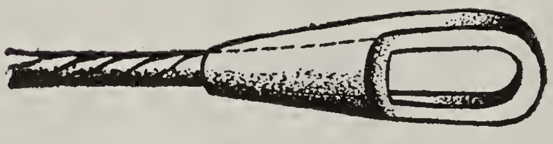
CLAMP IN USE



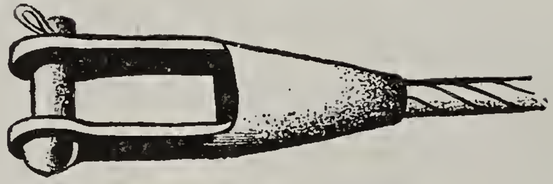
RIGHT

WRONG

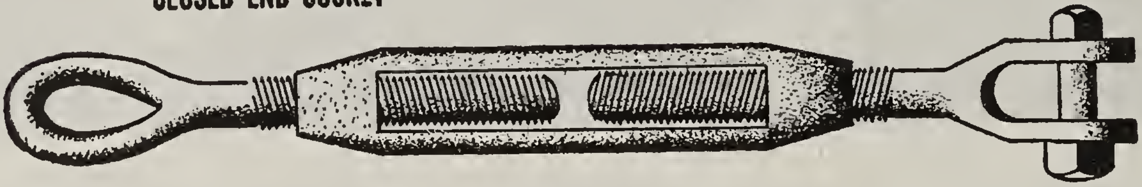
CLIPS IN USE



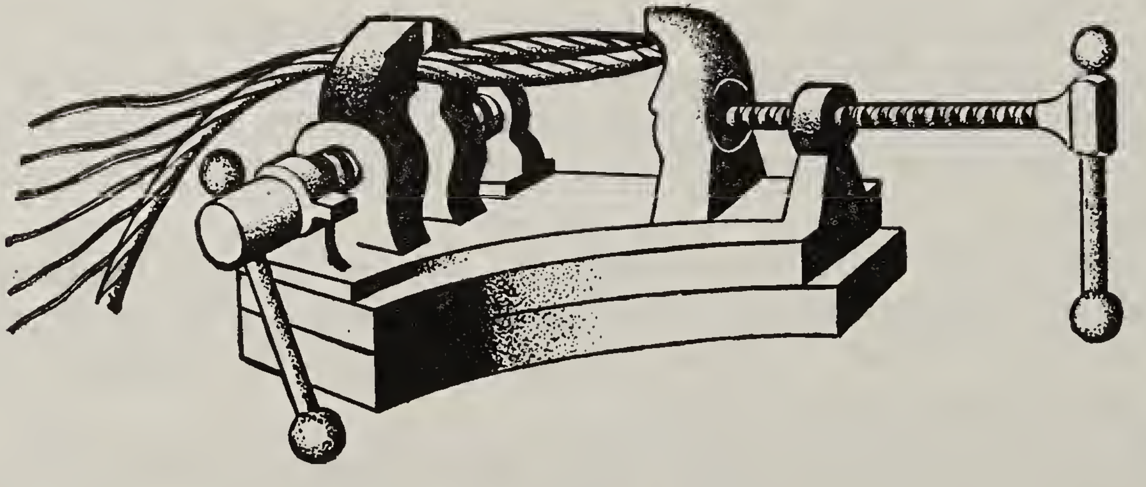
CLOSED END SOCKET



OPEN END SOCKET



TURNBUCKLE



RIGGERS SCREW

FIGURE 36-11.—Devices used with wire rope.

down to half their original diameter, when there are numerous broken wires, or when there are any other indications that it has been kinked or subjected to excessive strain. Wire almost never fails if used within its proper working limits.

Care of the rigging.—Wire rigging is protected by being galvanized and then wormed, parceled and served, and coated with tar oil and coal tar. The tar must be renewed at regular intervals; usually once in 6 months is sufficient. All rigging must be gone over carefully at frequent intervals to make sure that no part of it is deteriorating. If the wire is not galvanized, it should be covered with a mixture of red lead and boiled linseed oil before worming, parceling and serving. Turnbuckles can well be preserved by giving them a very careful coating of heavy grease, then serving with a neat canvas cover over the turnbuckle to preserve the grease.

Smoke-pipe guys should be slacked off a bit when fires are lit off under the boilers to which the smoke pipes lead, as heat from the fires causes the smoke pipe to expand considerably.

Use of wire line.—In choosing a wire line the type of construction depends upon whether the line is to remain stationary or is to operate over sheaves, fair leads or drums. If it is to operate over drums, the speed at which it will run, the size of such sheaves and the material of which they are made are important considerations.

Wire splicing.—Wire splicing requires considerable practice. The best way to learn this work is by watching or assisting an expert.

CHAPTER 37

Anchoring, Mooring, Docking

ANCHORS

Anchors are usually made of cast steel; the fittings and the shanks of housing anchors are of forged steel.

Anchors vary in weight from 30 pounds to about 30,000 pounds. Their weight, as well as a Bureau of Ships serial number and the date of manufacture, is stamped on them near the base.

Edges of anchors are smoothed to prevent damage to the ship's hull when hoisting.

A ship may carry *bower, sheet, stream, stern, kedge and boat anchors.* These names are derived from the position or use of the anchor and apply regardless of the type. They are defined as follows:

1. *Bower anchor.*—These anchors are carried in the bow and used for all anchoring, except in unusual circumstances.
2. *Sheet anchor.*—These are reserve anchors which were formerly carried by large ships. They were the same weight as the bower anchors and were carried on deck, or, more usually, housed in a hawse pipe just abaft the bower anchor.
3. *Stream anchor.*—This is an anchor of medium weight for miscellaneous use. It is called a *stream anchor* because an anchor of this type was carried at the stern on men-of-war in the past as they were frequently required to anchor in rivers and other confined waters. It was often necessary to secure the ship with anchors both bow and stern to prevent swinging.
4. *Stern anchor.*—This is any anchor which is carried in the stern, regardless of weight or purpose.
5. *Kedges.*—These are small anchors, usually of the Navy type, the heaviest of which does not weigh more than a ton. They are intended for kedging; that is, moving a ship ahead a small distance at a time by taking one of the anchors out in a boat, letting it go, and then hauling the ship up to it. If this is done to change the heading of the ship, it is called *warping.*
6. *Boat anchors.*—These are small Navy-type anchors for use in boats.

Windlass.—There are a number of types of windlass used for handling anchors and cables. The windlass consists of a steam-engine or electric motor which turns a shaft, either horizontal or vertical, on which is mounted a wildcat or chain grab, over which the chain passes and by which its links are engaged. The wildcat turns loosely on the shaft, but may be secured rigidly to it by some form of locking device, and much of the individuality of different types of windlass lies in the nature of this device. The

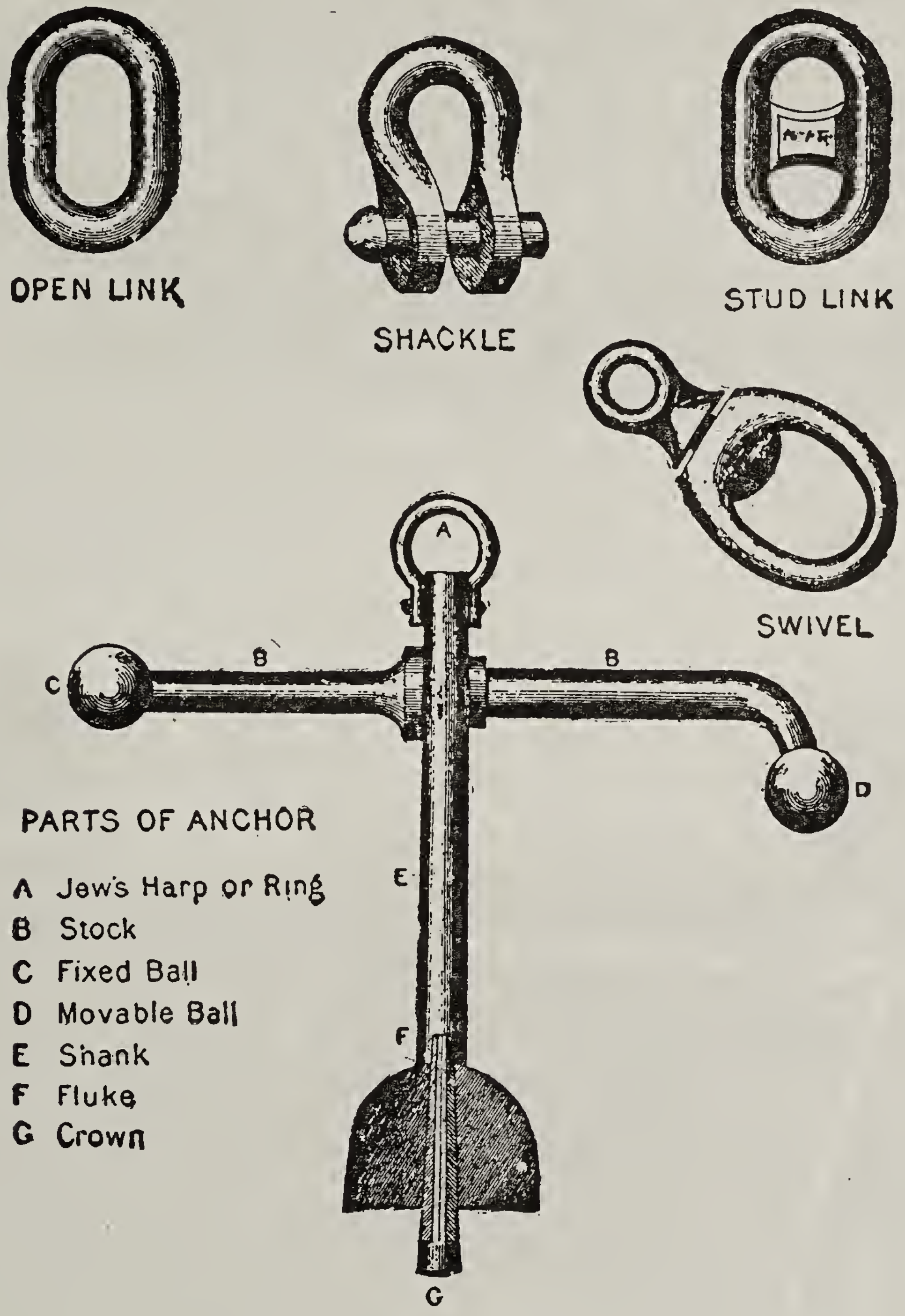


FIGURE 37-1.—Old-fashioned anchor.

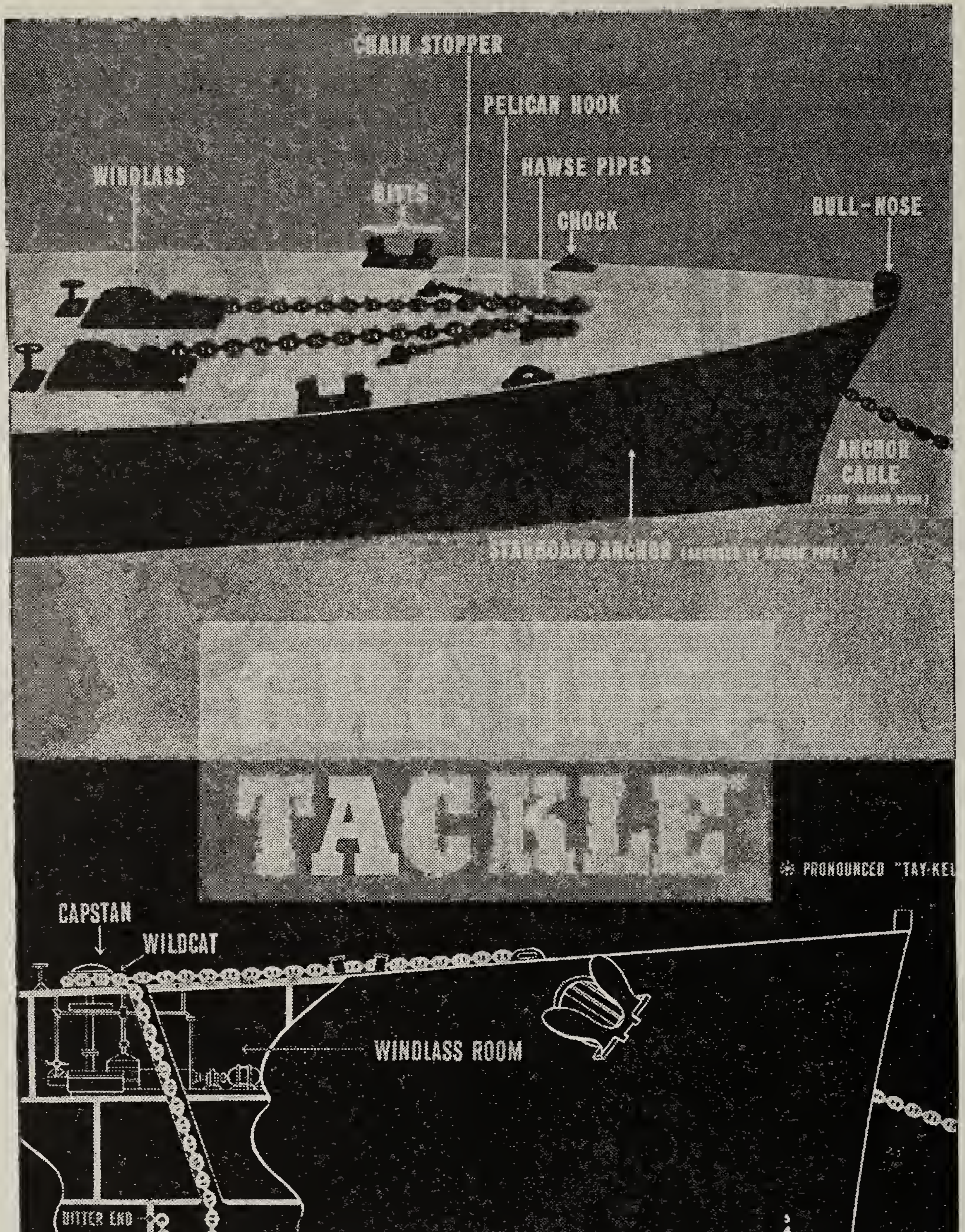

CHAIN STOPPER
PELICAN HOOK
HAWSE PIPES
WINDLASS
BITTS
CHOCK
BULL-NOSE
ANCHOR CABLE
STARBOARD ANCHOR
TACKLE
✻ PRONOUNCED "TAY-KEL
CAPSTAN
WILDCAT
WINDLASS ROOM
BITTER END
CHAIN LOCKER

Figure 37-2

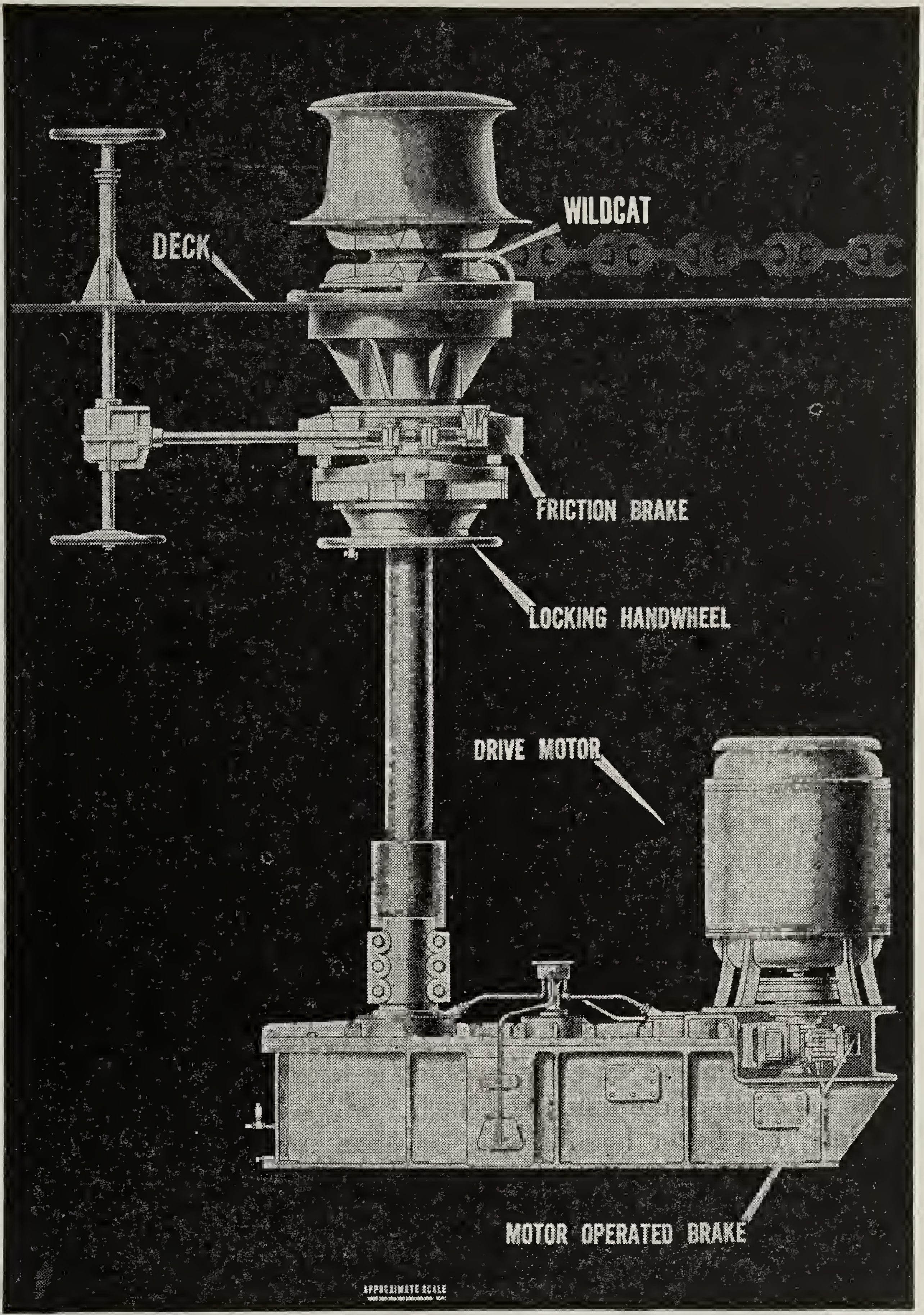


FIGURE 37-3.—The wildcat, its shaft, and its motor.

wildcat is secured to the shaft for heaving the chain or paying out small amounts, but is disconnected in dropping anchor.

When a ship is riding to its anchor, the chain is secured with from one to three stoppers, the wildcat is disconnected from the shaft, and the brake is set up taut.

A deck stopper consists of a pelican hook and a turnbuckle inserted in a short length of chain. It is secured to a permanent pad on the deck. The stoppers add to the holding power of the brake; disconnecting the wildcat avoids possible damage to the anchor engine. This hook-up also facilitates veering, running out more chain when the anchor is already down. This may become necessary in rough weather or under circumstances which increase the danger of dragging.

Letting go.—Preparatory to anchoring, all but one of the stoppers are slipped, the brake is released so that the anchor is supported by the remaining stopper and, if there is a long space between the anchor and the wildcat, a few links of the cable are "roused up" on deck. If the ship is anchoring in deep water, the anchor may be "walked out" slowly by the engine. An order is given to stand clear of the chains, and it is very important that this be obeyed, because nothing will stop an anchor cable which parts, or whips, and there is a possibility that everything on the forecastle may be wiped clean. On the command to "Stand by" and before letting go, the toggle is taken out of the pelican hook and a man stands by with a sledge. On the order, "Let go," the pelican hook is knocked open with the sledge and, if necessary, the anchor is given a shove to start it.

As the chain runs out, the amount, strain, and its angle relative to the bow are reported; as "Thirty fathoms on deck, sir; no strain; chain tending slightly aft" ("tend" is used with chain, as a verb, to state the direction of the chain relative to the bow). In calm weather the amount of cable put out is usually equal to about 5 times the depth of the water. One anchor with a long scope (amount) of chain has better holding qualities than two anchors each with half as much chain, because a short scope causes a pull on the anchor which may loosen the flukes.

As a rule, a small anchor buoy is attached to the crown of each anchor by a light line. An anchor buoy indicates by floating above it the actual position of the anchor to which it is attached. Each buoy is usually painted a distinctive color, as green for starboard anchor, red for port anchor and white for stem anchor. If an anchor buoy floats on the surface, it is said to be watching. An anchor buoy may fail to watch because its line is too short or is fouled in the chain or because the buoy itself is water-logged.

Before anchoring, the line which attaches the buoy to the anchor should be adjusted to a length which is a couple of fathoms greater than the depth of water at the anchorage. This extra length is to allow for slight fouling, variation of the tides or sinking of the anchor in mud which might cause the actual depth to be greater than that shown on the chart. However, there should not be so much spare line on the anchor buoy that it will greatly exceed the expected depth of water at the anchorage. The anchor buoy and line must be laid up along, and outboard of, the life lines. It should be put overboard, or streamed, well clear of the ship the instant the anchor is let go.

An anchor buoy is an invaluable timesaver in locating an anchor which has been lost in weighing or which may have been slipped in an emergency. Slipping an anchor is intentionally allowing either the bitter end of the chain or that section outboard of a disconnected shackle to run out. This is done when unforeseen circumstances do not permit time to take up the anchor.

Weighing anchor.—Prior to hoisting the anchor, the engine is warmed up, if of the steam type, and tested in any case. The wildcat is then engaged with the shaft, the brake released, a strain taken on the chain, and the stoppers cast loose. Before the time set for getting under way and after the main engines have been tested, the anchor is usually hove in to short stay, a condition in which there is no more chain out than is necessary to keep from pulling the anchor loose from the bottom. This is not done except on order of the Officer of the Deck, and he usually designates the amount of chain to be taken in, as "Heave-to to 10 fathoms."

When ready to get under way, the anchor is hove in as ordered from the bridge, and the amount of chain out is reported to the bridge from time to time. Orders may be received to heave in to any number of fathoms or to heave right up. In any case, report is usually made when markers are at the water's edge ("fifteen fathoms at the water's edge, sir"), when the anchor is at "short stay," "up and down," "aweigh," "in sight," and secured or ready for letting go. The anchor is "up and down" when the stock has been pulled up from the bottom, but the crown is still touching. The action of the chain signifies this condition of the anchor and it is judged either by the officer in charge of the forecastle or by the boatswain. With the report "Anchor in sight" goes one regarding its condition, as "Anchor in sight, sir; a clear (foul) anchor."

As the chain comes in, a hose is played on it to remove mud. Pressure on deck mains should be asked for ahead of time. Also, the markings are usually repainted, the old mark having first been wiped; each link is tested by striking it with a hammer. If a link rings it is all right, but if it sounds flat the first lieutenant or the boatswain should be notified immediately.

Stowage of chain.—As the chain comes aboard, it passes along the deck, on metal flash plates in large ships, over the wildcat, and down into the chain locker. Each chain goes into a bin and its bitter end is rove through a ring bolt at the bottom of this bin and is secured to the upper part of the bulkhead of the bin by a pelican hook.

Securing.—If the anchor is of the stockless type, it is housed in the hawse pipe and is secured in the same manner as a riding

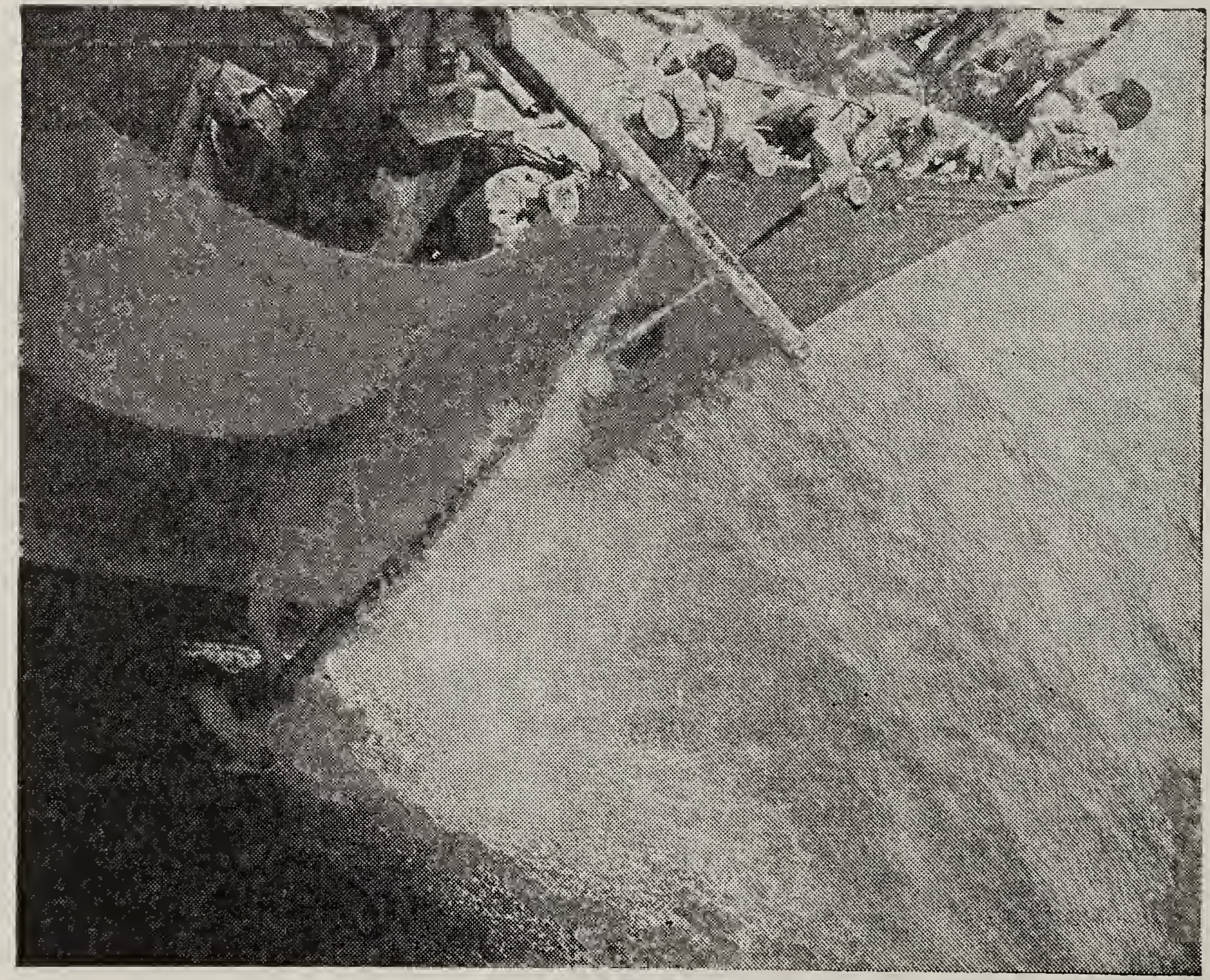


FIGURE 37-4.—Playing hose on anchor chain to remove mud.

chain. The anchor must be drawn taut in the hawse pipe by the outboard stopper to prevent the flukes from banging against the sides. Stoppers are attached to the chain by straddling a link with the tongue and link of the pelican hook, and the turnbuckle must be so adjusted that each stopper will take an equal strain. The cotter pin, or toggle, which keeps the pelican hook closed must then be inserted in the tongue of the pelican hook.

It is frequently necessary to block up the chain so that the stopper may catch a particular link. This is done to avoid large adjustments of the turnbuckle and is well worth while, because changing the set of a large turnbuckle is laborious and it is absolutely essential that a strain be taken by the stopper.

Rope stoppers are usually regarded as deck stoppers; stoppers having pelican hooks, but without turnbuckles, as slip stoppers. In the turnbuckle class, the outboard one is usually called the housing-chain stopper and those inboard of it riding-chain stoppers.

MOORING SHIP

A vessel in mooring uses two anchors separated at such a distance that her bow is held practically stationary in the line joining the two anchors. The vessel will swing around her stem as a pivot. The chief advantage of anchoring in this fashion is that a ship will swing in a much smaller space than if one anchor were down. Usually ships are moored in places where the anchorage space is limited and the harbors are congested.

Heaving a line.—A heaving line is a light line used to get a hawser ashore when mooring a ship to the dock or in passing a heavy line for any purpose whatever. One end of the heaving line is fitted with a fairly heavy knot to assist in getting distance when heaving, but loaded lines are non-regulation. The other end of the heaving line is bent to the hawser with a clove hitch. The rest of the heaving line is carefully coiled; about two-thirds of the coil being held loosely in the left hand and the rest in the right or heaving hand.

In heaving, the right (casting) arm should be held straight and the line in the left hand allowed to run out freely. The most frequent trouble in getting a long heave is due to the coil in the left hand not being arranged clear for running. Frequent practice is necessary to become proficient and everyone should practice making casts at every opportunity. A poor cast is always a reflection on the ability

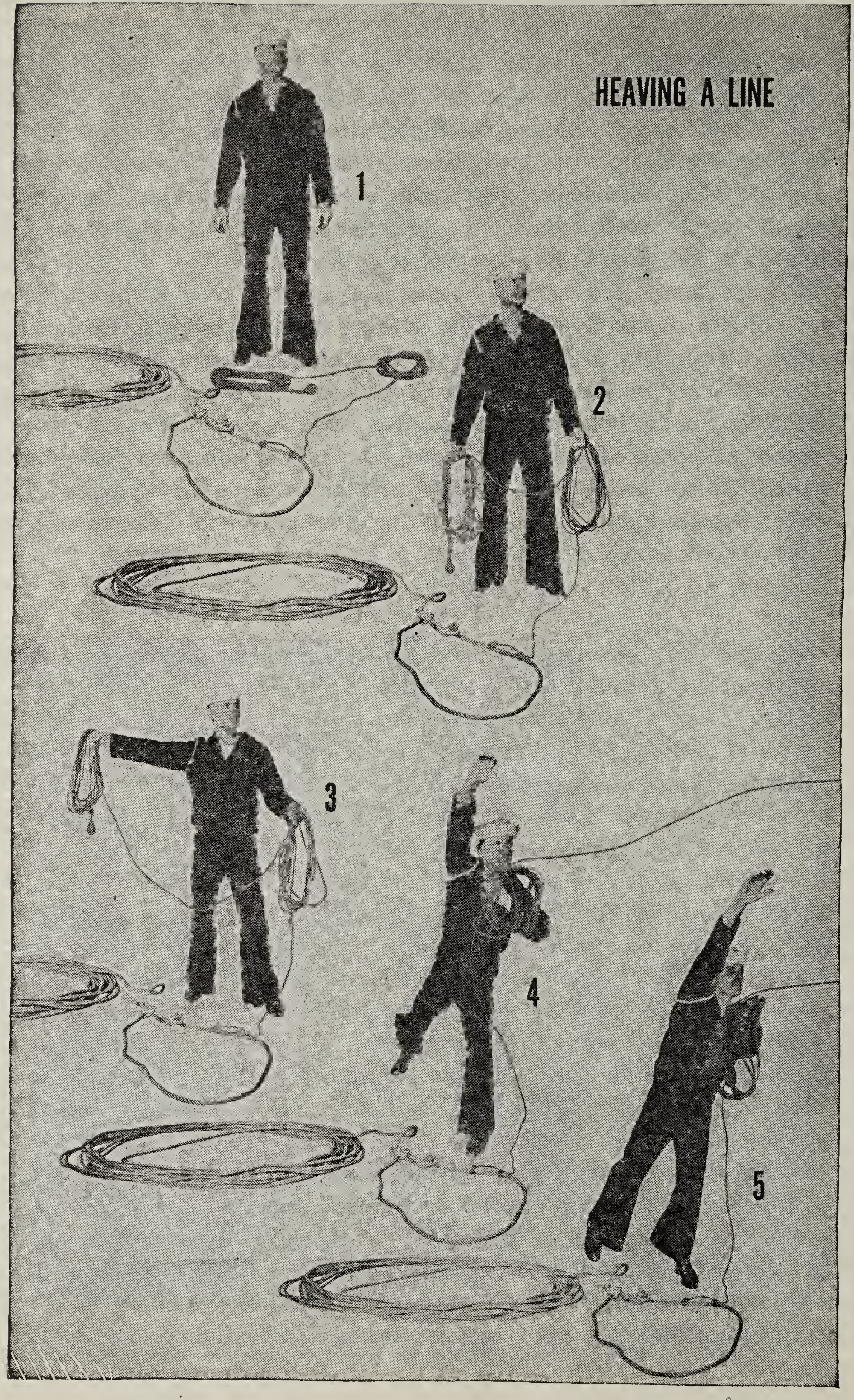
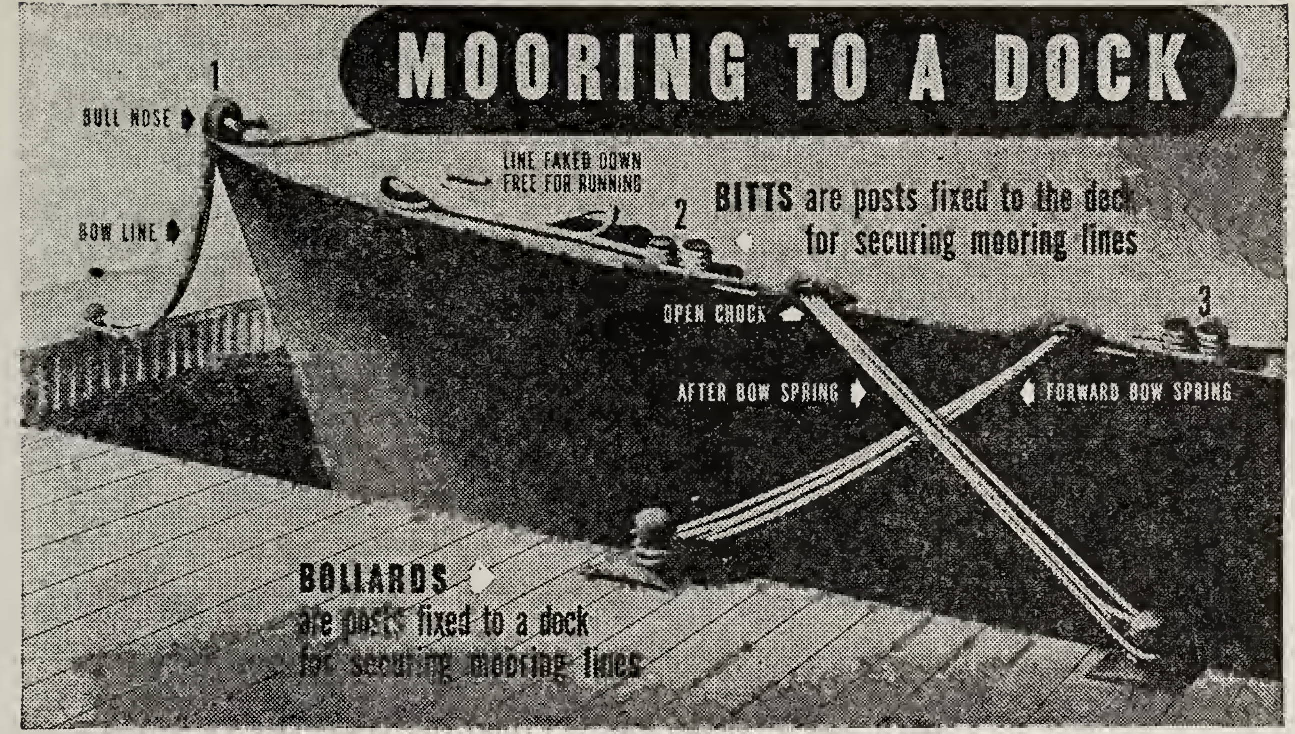
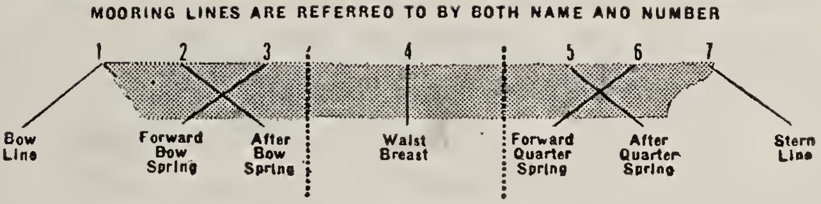


Figure 37-5


MOORING TO A DOCK
1
BULL NOSE
BOW LINE
LINE FAKED DOWN FREE FOR RUNNING
2
BITTS are posts fixed to the deck for securing mooring lines
3
OPEN CHOCK
AFTER BOW SPRING
FORWARD BOW SPRING
BOLLARDS are posts fixed to a dock for securing mooring lines



Spring Lines Run Sharply Forward and Aft from the Ship and May Be at the Bow, Waist, or Quarter

Breast Lines Run at Right Angles to the Ship and May Be Forward, Midships, or Aft

FIGURE 37-6

of the seaman. The pictures show the correct method of heaving a line.

Mooring a ship with lines.—A ship is moored when it is made fast to a mooring buoy, when it is swinging on the bight of a chain between two anchors in line, or when it is secured alongside a dock or another ship, by lines.

The bow line and forward springs prevent the ship from drifting astern. With sternway on, both these lines, when secured, tend to breast the ship in.

The stern line and after springs prevent the ship from drifting forward. With headway on, both these lines, when secured, tend to breast the ship in.

The forward and after breast lines prevent the ship from drifting away from the dock.

When mooring lines are used for handling the ship in coming alongside, it is very important that they be got out as soon as possible and that the orders of the officer conning be promptly and accurately obeyed. In these orders the lines are referred to by numbers, the forward line being No. 1, and you may be told to hold, check or keep slack in any of them, as "Hold one, Slack two, Check three."

When a line is checked, it is payed out a little at a time as the strain on it becomes heavy. A line should be checked rather than parted, even without orders, but you should watch your line carefully; foresee the fact that the strain is about to become dangerous and inform the person in charge. Warning of a dangerous strain is given by observation, by the creaking of the hawser, or by standing on it to feel the strain. If it is inevitable that a line will part, stand clear because the end will whip and might seriously injure you.

Lines are singled, that is, there is only one part leading to the dock, while mooring, but they are doubled up in securing, with one or more bights being looped over each cleat or bollard (an upright post on a dock), so that there will be several parts to each line. When doubling up, the lines should be rove around so that each part is of equal length, otherwise one part of the hawser will carry the entire strain. Two different lines may be used if the original is not long enough for doubling. In mooring to a dock, slack must be left to allow for the rise and fall of the tide, and all lines should be watched for maximum strain at high or low water and slackened or tautened as necessary.

All lines, where they are subject to wear, as where they go through the chock on the ship or where they rest on the dock, should be protected by chafing gear. This is usually old canvas strips wrapped around the lines and secured with lashings.

Rat guards are always put on the mooring lines of an inboard ship, to prevent the rats from coming aboard over them. They consist of a circular metal disk, made in halves, which can be lashed together on the lines. They usually dip toward the center and the concave side should face outboard.

Some large ships have mooring staples permanently built on their sides. These are large, oblong metal eyes to which chains can be attached in securing to a deck. Battleships usually have 3 on each side.

So far as practicable, lines should be kept clear of the water at all times.

Never attempt to check a line which is running out rapidly by stepping on it. If you do, you will probably find yourself with a broken leg or over the side.

Mooring to a buoy.—Large ships infrequently moor to a buoy, but it is a part of a destroyer's regular routine. The systems for both types of ship are essentially the same, and the one for destroyers will be discussed here.

Mooring buoys are usually equipped with a ring on top, and mooring to one consists, essentially, in leading an anchor chain through it and back on deck. Accomplishing this, however, is not so simple. Preparations must be made, the ship must be brought up and held over the buoy, and the chain rove through the ring, sometimes laboriously. The bow is brought over the buoy, if possible, under the ship's own power and is held in this position by a line large enough to secure the ship temporarily. One end of this line is usually shackled to a ring on the buoy, and the other retained on board and secured after the shackling. This line may be secured, if conditions are ideal and the whole operation performed expertly, by a man lowered from the deck. However, it is usually led out by a boat preceding the ship, due to the difficulty involved in placing the bow right over the buoy and keeping it there for any length of time.

In preparation, a seaman wearing a life jacket should be lowered in the boat, and he should have with him a large open shackle, with the pin secured to it with a light lanyard, and a wrench. The chain should be unbent, led through a forward chock, and a dipping line attached to the end link; chain stoppers should be cleared, and heaving lines, small fenders, and convenient tools provided.

When near enough to the buoy to avoid causing the boat to tow an excessive length of line, the securing line is given to the boat where it should be held by a turn around a fixed object, and the shackle then should be bent on its end.

The boat lands the man on the buoy, where he completes the shackling as quickly as possible. The coxswain of the boat must be careful not to foul his propeller in the line or to damage his boat against a rolling buoy, and he should clear the buoy after landing the line, but remain near to help if necessary. The boat should take the man off the buoy when the shackling is completed because the buoy may roll heavily if struck by the ship or if caught in the wash.

When the line is secured to the buoy, the slack may be taken in on deck and held. This securing line, led to the capstan, may also be used to bring the bow up to the buoy, but this will careen the buoy. Care must be taken to avoid parting the line.

As soon as the ship is in position, the buoy man returns to the buoy, receives the dipping line from deck, passes it through the ring, and returns the end to deck, preferably by means of a heaving line dropped to him. This line may be taken to the capstan and it and the chain drawn through the ring and back on deck, where the bitter end of the chain is secured by stoppers, after a sufficient bight has been run out to prevent the ship's riding the buoy. It may be necessary for the buoy man to assist during this operation by rendering the chain through the ring, but it is usually better for him to leave the buoy and return, if this becomes necessary, in order to avoid the possibility of his being thrown from the buoy or caught between the buoy and the ship.

The chain having been stopped on deck, the securing line may be disconnected.

Mooring to a buoy requires a thorough knowledge on the part of all hands, and seamen frequently have several important stations. All apparatus must be immediately ready because the operation must be accomplished as quickly as possible, otherwise the bow may fall away from the buoy and the ships which are waiting to come alongside may be held up. A miscue on the part of anyone may delay the procedure long enough to require a new approach, and might cause serious damage to the boat or even cost the life of the man on the buoy.

Fenders.—Laying out fenders prior to going alongside is all important. Therefore, the seaman responsible for breaking out the fenders should be sure that enough of them are placed at convenient points along the deck.

Fenders must also be handled intelligently. When it is apparent that the ship is about to touch, the men detailed or anyone unoccupied, should put a smaller fender over the side at the point nearest to striking. It does no good if the fender is just dropped into any open space. It may be necessary to allow it to roll as the ship moves on it or to shift it forward or aft to cover a new danger point. Frequently, a great deal of good may be done by placing a fender so that it will come up against another held on the other side or on the dock. No cut-and-dried rules can be given; handling fenders simply requires good "horse sense" and does not allow "sleeping on the job."

Destroyers suspend a large fender from the gallery deckhouse prior to going alongside, the ship going alongside being required to furnish the fender. This fender must be eased over so as not to part its securing line and should be suspended just above the water line. It may be held either vertically, by a line at one end, or horizontally, by a line at each end.

Wooden spars, or floats, may be secured to a dock to act as fenders between the ship and the piling. These are called *camels.*

CHAPTER 38

Deck Tools, Fittings, and Machinery

You will find that the deck tools, fittings and machinery found aboard ship will depend upon the nature of the services the ship is expected to perform. Some of the more common deck machinery is discussed in this chapter, such as anchor handling gear, cargo handling gear and boat handling gear. However, our fighting ships are stripped down to bare essentials and much equipment found on these ships in peacetime has been removed. The capacity of the various items of equipment and the number of units which must be provided is based on the equipment tonnage.

WINDLASS

An anchor windlass is used for dropping or hoisting the anchor. It is an apparatus in which horizontal or vertical drums are operated by means of a steam engine or motor for the purpose of handling heavy anchor chains. The drums over which the chain cable passes are known as wildcats. They have projections known as whelps which fit the links as they come over. By means of a clutch, the wildcats may be made to revolve with the shaft driven by the anchor engine or they may be allowed to turn freely. Brakes are fitted to control the speed of the wildcats when they are disconnected by means of the clutch. When the anchor is dropped, the clutch is disconnected and the wildcat controlled by the brake. When hoisting the anchor, the clutch is connected and the wildcat is turned by the shaft. When it is desired to pay out only a few links, the engine can be walked back. For safety the windlass must be securely bolted down and the deck beams below it are required to be of extra strength and adequately supported.

CAPSTAN

In addition to the windlass a capstan, which is a vertical drum or barrel operated by a steam or other type of engine, is also used for handling heavy hawsers, mooring, warping or towing gear. The engine is usually non-reversing and transmits its power to the capstan shaft through a worm wheel. The drum is fitted with pawls to prevent overhauling under the strain of the hawser or chain when the power is shut off. The engine may be disconnected and the capstan operated by hand using capstan bars.

A windlass has a vertical axis and a capstan has a vertical axis. A winch has a horizontal axis.

CARGO HANDLING GEAR

It is always necessary for a ship to handle a great deal of cargo. The general cargo handling gear to be found aboard most ships consists of: (1) cargo winches, (2) masts or derrick posts and booms, (3) fittings for masts and booms, (4) running and standing rigging, and (5) cargo nets, slings and platforms.

The general requirements for such equipment are that cargo handling gear shall be adequate in power; that the power leads shall be protected against mechanical injury and damage from water and freezing; and that the devices shall be designed to prevent injury to personnel or equipment in event of power failure or dropping of the load.

WINCHES

Winches are hoisting or pulling machines fitted with a horizontal single or double drum. A small drum is generally fitted on one or both ends of the shaft supporting the hoisting drum. These small drums are called gypsies, niggerheads or winch heads. The hoisting drums are either fitted with a friction brake or are directly keyed to the shaft. The driving power is usually steam or electricity, but hand power is also used. A winch is used principally for the purpose of handling, hoisting and lowering cargo from a dock or lighter to the hold of a ship and vice versa. It is also used for mooring, warping and towing gear.

THE SPAN

The span is used by vessels having the yard and stay method of handling cargo.

A span is frequently used in confined spaces where it is necessary to move a weight in a vertical direction and then in a horizontal direction, as for example pulling a pump out of its well, then moving it under a hatch.

Other examples of the span are:

1. A vessel moored and riding with her keel at an angle to her line of anchors.
2. A round turn (strap) passed around a spar (yard).

BLOCKS

A frame of wood or metal which incloses one or more sheaves, or pulleys, is known as a block. By leading a line over the sheaves, the power applied to the hauling part of a line may be multiplied conveniently before it reaches the object on which a pull is to be exerted. These combinations of lines and blocks are known as tackles (*pronounced tākles*).

Blocks ordinarily consist of four parts, (1) the frame or outside; (2) the sheave or wheel over which the rope passes; (3) the pin or axle on which the sheave turns; and (4) the strap inclosing the frame by which the block is held together. Blocks whose frames are composed of several pieces riveted or bolted together are called *made blocks,* while those having the frame in one piece are called *mortised blocks.* The sides of the frame are called the *cheeks* of the block. The holes through which the rope reeves are called the *swallows.* The grooves cut on the sides and one end of the cheeks to allow the strap to fit in are called the *scores.* The end of a block which is opposite to the swallow is called the *breech.* The complete outer part is known as the *shell.*

A block may take its name from its particular use, its shape, or the place it occupies. Most types of block may be *single, double, treble,* or *fourfold,* depending upon the number of sheaves the block has. The length of the frame determines the size of a block, *i.e.,* a 12-inch block is a block with a frame 12 inches long. Standard blocks are furnished in sizes from 4 to 24 inches; thus, we might have a 12-inch, threefold, metal cat block. Several types of block are illustrated in figure 38-1. The fiddle block gets its name from its shape, cat and fish blocks from the fact that they are used for catting and fishing an anchor, and gin blocks from the fact that they were originally attached to gins, which are 3-legged, portable hoisting rigs.

Snatch blocks are fitted with a hinged shell or hook, so that a rope may easily be snatched on the bight. These blocks are about the handiest used aboard ship. When used, care must be taken to see that they do not open at the wrong time.

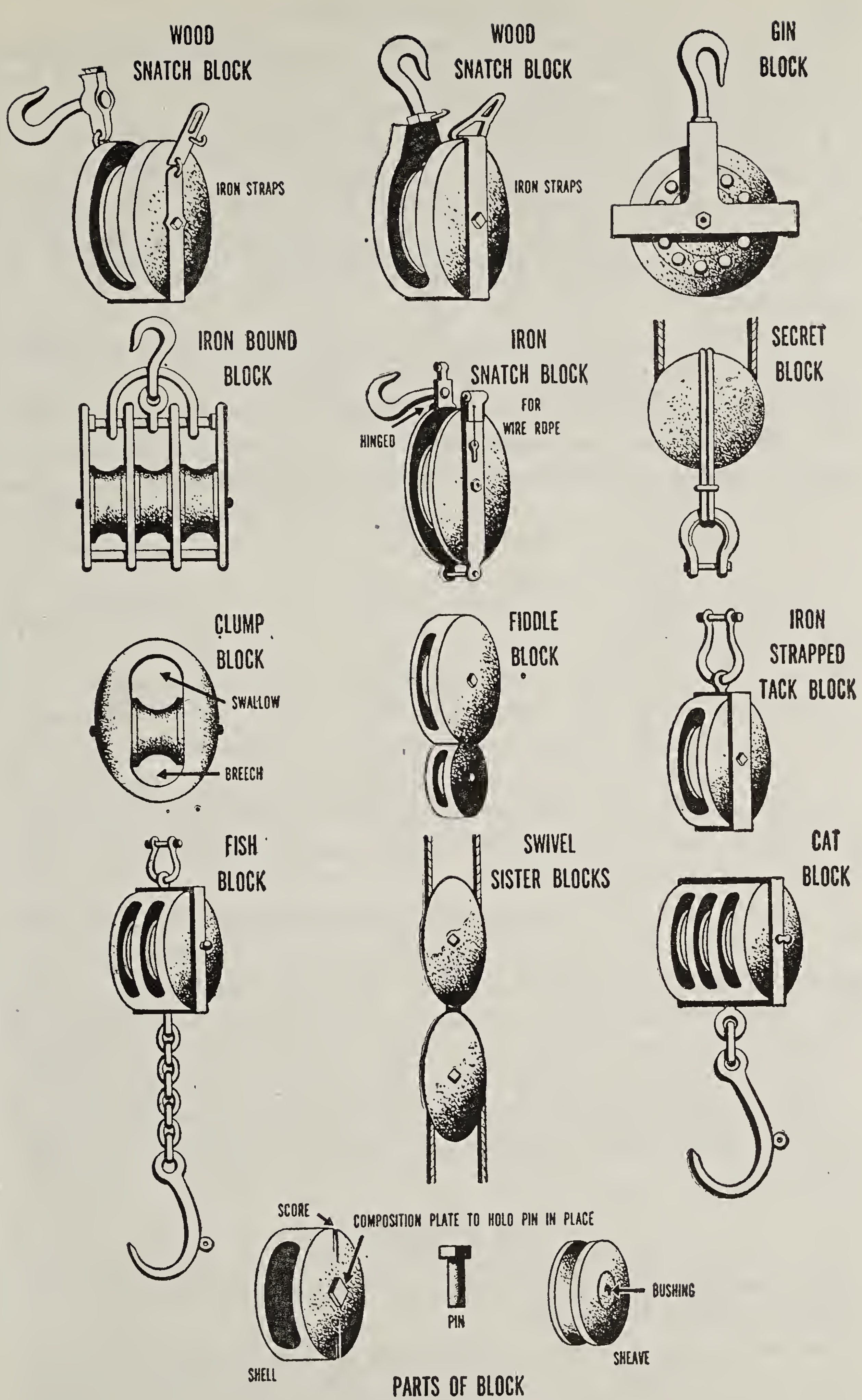


FIGURE 38-1.—Blocks.

Gin blocks.—In this type the shell is merely a guard to keep the rope from running off the score of the sheave.

A fish block is the lower block of a fish tackle fitted with a fish-hook and used for fishing an old-fashioned anchor. Where anchors are catted, the upper sheaves of the cat fall are rove through the cat head and the lower through the cat block and the cat block is fitted with a cat hook. Fishing cat blocks are either double or treble blocks.

Sister blocks have two sheaves in one shell, one above the other, so fitted that the falls lead in opposite directions.

A secret block is used when it is desired to prevent gear fouling in the block. This is a single block with a closed shell having two holes in the lower part through which the fall passes.

A fiddle block is a double block having the sheaves in the same position as found in a sister block but the falls lead the same way instead of in opposite directions.

A clump block is a very small and very strong egg-shaped block with a rounded shell.

A sheet block has only half a shell covering the sheaves.

There are several other types of block, such as *tye blocks*, *dasher blocks*, *jerr blocks*, and *tail blocks*. These blocks are not described as they are not common aboard naval vessels. The general principles of all blocks are the same and the bluejacket should have no particular trouble in using blocks properly if they are kept free of dirt, rust, etc., and are properly lubricated.

Blocks for use with wire rope are not so well standardized as those used with fiber rope. Wire rope can now be made to conform to widely varying specifications. When specifications for blocks are drawn the advice of the manufacturer should be followed as to diameter of sheave or drum over which the wire is to be rove and the speed of operation (linear speed of the wire). If such advice is not followed the life of the rope will be shortened materially due to alternate bending and straightening as the wire passes over the sheave (drum).

TACKLE

An assemblage of ropes (falls) and blocks for the purpose of multiplying force is a tackle.

The seaman speaks of "reeving" when he passes ropes around the sheaves of the blocks. These ropes are called "falls." The "standing part" is that part of the fall made fast to one of the blocks. The

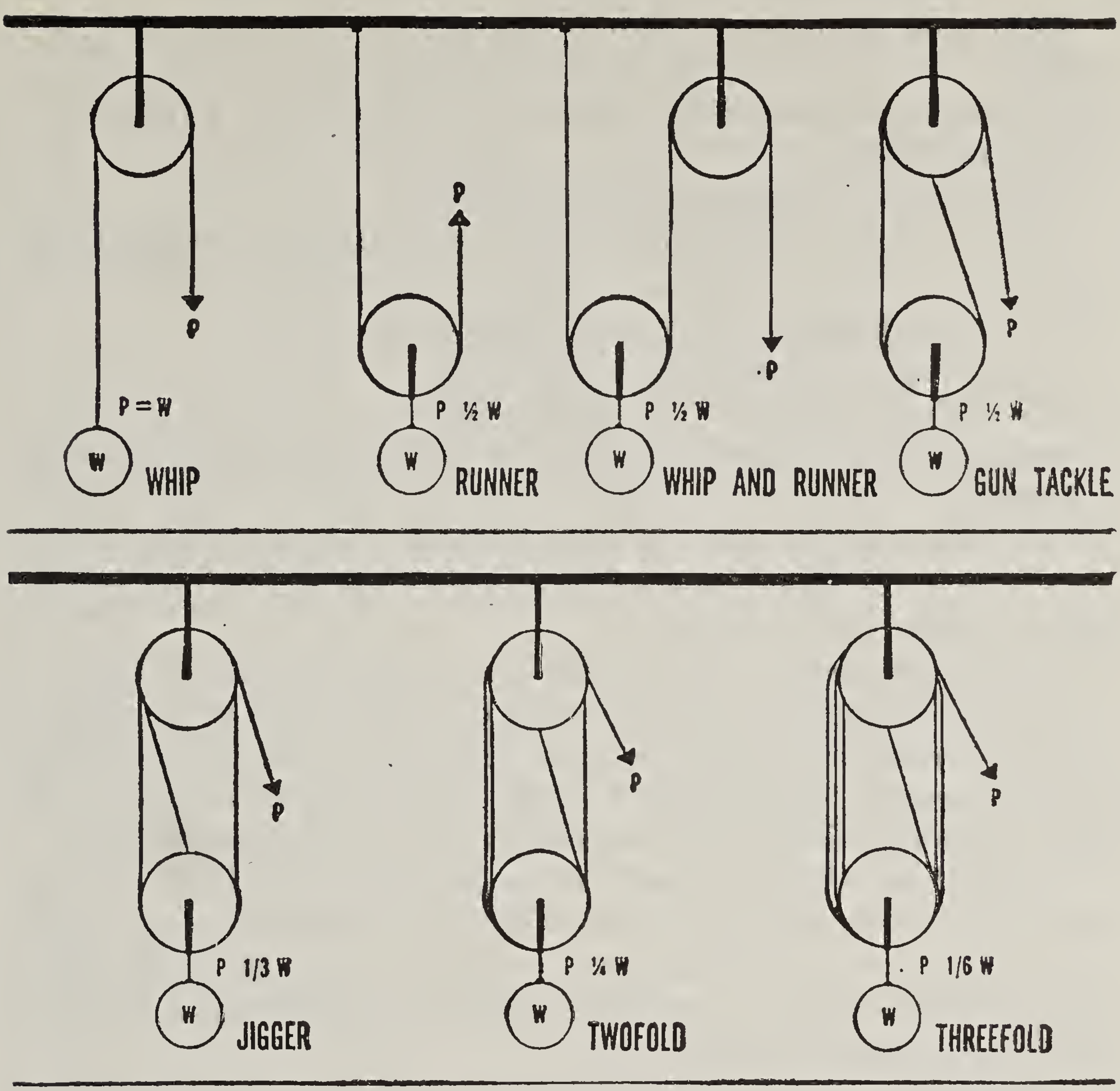


FIGURE 38-2.—Tackles.

hauling part is the end of the fall to which force is applied to handle the weight. To "overhaul" the falls is to separate the blocks. To "round in" is to bring the blocks together. The blocks are said to be "chock a block" or "two-blocked" when they are tight together.

Tackles are designated either according to the number of sheaves in the blocks that are used to make the tackle; as, single, two-fold, three-fold purchases; or, according to the purpose for which the tackle is used; as yard-tackles, stay-tackles, fore-and-aft tackles. Other designations handed down from the past still persist. as luff-tackles, gun-tackles, Spanish burtons. The following types are those usually found on board ship:

Single-whip.—A single block fixed.

Runner.—A single movable block.

Whip and runner.—A whip hooking to the hauling part of a runner.

Gun-tackle purchase.—Two single blocks, the lower a runner and the upper fixed.

Luff-tackle.—A single and double block.

Luff upon luff.—The double block of one luff-tackle hooked to the hauling part of another, thus multiplying the power.

Two-fold purchase.—Two double blocks.

Double luff.—A double and treble block.

Three-fold purchase.—Two treble blocks.

A three-fold purchase is the heaviest purchase commonly used on shipboard.

The following are some of the purchases commonly used, designated by terms descriptive of their use, without reference to the blocks or sheaves involved:

Relieving-tackle are used to assist or replace the tiller ropes in steering. One block hooks to the tiller, the other to the ship's side.

Stock-and-bill-tackles are used in getting the anchors on and off the billboard in old-fashioned ships. They hook to straps on the stock and bill of the anchor respectively, and lead across the deck.

Thwartship-tackles are used on the heads of boat-davits for rigging in. In a more general sense the term is applied to any tackle leading across the deck. Similarly, a tackle for hauling out the backbone of an awning or for any other purpose where it has a fore-and-aft is a fore-and-aft tackle.

Hatch-tackles are used at hatches, for hoisting, lowering stores, etc.

Jiggers are small light tackles used for miscellaneous work about the ship.

A *deck-tackle* is a heavy purchase, usually two-fold, used in handling ground-tackle, mooring ship, and generally, for heavy work of any kind about the decks.

PATENT CHAIN HOISTS

Various types of patent chain hoists (mechanical purchases) are used on board ship. Inasmuch as the chain hoists are classified according to the weight they are built to handle and their mechanical advantage is so designed that one man can pull enough force to lift the weight for which they are designed, no discussion of the mechanical principles of their design is given here. If the weight for which a given chain hoist is designed is exceeded, disaster is invited. Overloading usually makes itself apparent by requiring an unusually heavy pull to raise the weight, by the spreading of the weight hook, or by the parting of the lifting chain. Overloading is to be carefully guarded against when using chain hoists as yard and stay tackles.

RIGGING GANGWAYS AND BOOMS

Before starting to rig, the proper tools and parts should be provided. For the accommodation ladder, commonly called gangway, there should be jiggers, straps, hammer, wrench, davit, upper and lower platforms, bail, stanchions, handrails, necessary bolts and cotter pins, fender, boat line and the main body of the gangway. A man should be standing by with a life jacket on and a bowline around him. The upper grating is usually secured upright in the gangway opening on large ships, as this opening must be closed at sea. It is therefore only necessary to drop it and bolt the brace to the fitting provided on the side. The davit is usually in place. A strap is passed around the gangway and it is maneuvered to the proper position and over the side by means of the davit and a jigger hooked through the strap. It is then bolted to the fittings on the after, under side of the upper grating.

While the gangway is being held by the davit and straps, the lower grating is bolted on and the bail secured. The davit is then shifted to the bail, the permanent fender secured, the stanchions placed in their sockets, and the rails set on and secured. The large puddin' fender, if used, must be hoisted over the side with a jigger, lowered, and squared up; the boat line led out and its weight rigged. Care must be taken not to drop any bolts because the rigging may be held up until they can be replaced. Each stanchion must be placed in its proper socket, and each rail in its proper place; otherwise, they may not fit. Any man going over the side while under way, which is necessary in securing the brace and other parts, must wear a life jacket and bowline.

Booms are usually stowed completely rigged and a long oar is about all that must be provided. All rigging, however, should be cleared and led out. Booms are usually secured along the rail, with the outboard end aft and resting in a circular fitting. The outboard end is attached to the topping lift, the steadying guys led to the end, and guess-warps are secured along the boom. To haul out the boom, the forward and after guys should be manned and the after end elevated and given a slight start before the anchor is actually let go. Upon achoring, the end of the boom should be started on the run by shoving it smartly with an oar while the forward guy is also being hauled. The after guy is used to check too violent a swing. When the boom is out, the guys are tautened, the guess-warps cleared, and the topping lift elevated or lowered, as necessary to retain the boom level. A boom must never be left without first being squared up.

WORK ON STAGES

The use of stages aboard ship is so frequent that deck petty officers should always keep as many stages on hand as stowage space will permit. There should be a few short man stages for special purposes, such as smoke pipes. The method of rigging is a simple matter if the work at hand is carefully studied and proper plans made.

As a general rule, only experienced men should be put on the stages. Working on a stage is not especially difficult, but it is harder than working on deck. Men should not get their first training in painting on a stage. As someone must tend the stages at all times, it follows that more man-hours are expended doing a piece of work on a stage than would be required if working on deck. Therefore the work should be done as soon as possible. One slow or inefficient worker on a stage may hold up the work of several men. The work on stages must be properly done as it is usually on an exposed surface, such as the side, where poor work is easily detected. For example, one streak of poor painting with a dirty brush or a few "holidays" will ruin the appearance of the whole side.

Whenever men are over the side on stages they must wear a bowline. This seems a nuisance but the possibility of a man falling overboard and striking his head, or falling into a strong current, or falling into a drydock makes this nuisance decidedly worth while. Men must have their lines tended and must receive gear to work with promptly. It is disheartening to the man on the stage and wasteful of the ship's time to have a man wait a long time for a new brush or more fresh water, or another pot of paint, or for someone to slack up on his bowline so that he can lower the stage.

BOAT HANDLING GEAR

Ships are equipped with devices called *davits* for lowering and raising ship's boats. Davits are sometimes used for other purposes.

The rotary or round bar (most common type) consists of a vertical pillar, generally circular in section, with the upper portion bent in a fair curve and having sufficient outreach to clear the side of the ship plus a clearance.

Each ship's boat has two davits, one near its bow and one near the stern; they both rotate, lifting the boat, by means of blocks and falls suspended from the overhanging end, from its stowage position on deck and swinging it clear of the ship's side.

In addition to the old style curved iron davit there are several patented systems of boat control. These mechanical davits are rapidly replacing the old style davit on merchant ships and are required on all new passenger vessels.

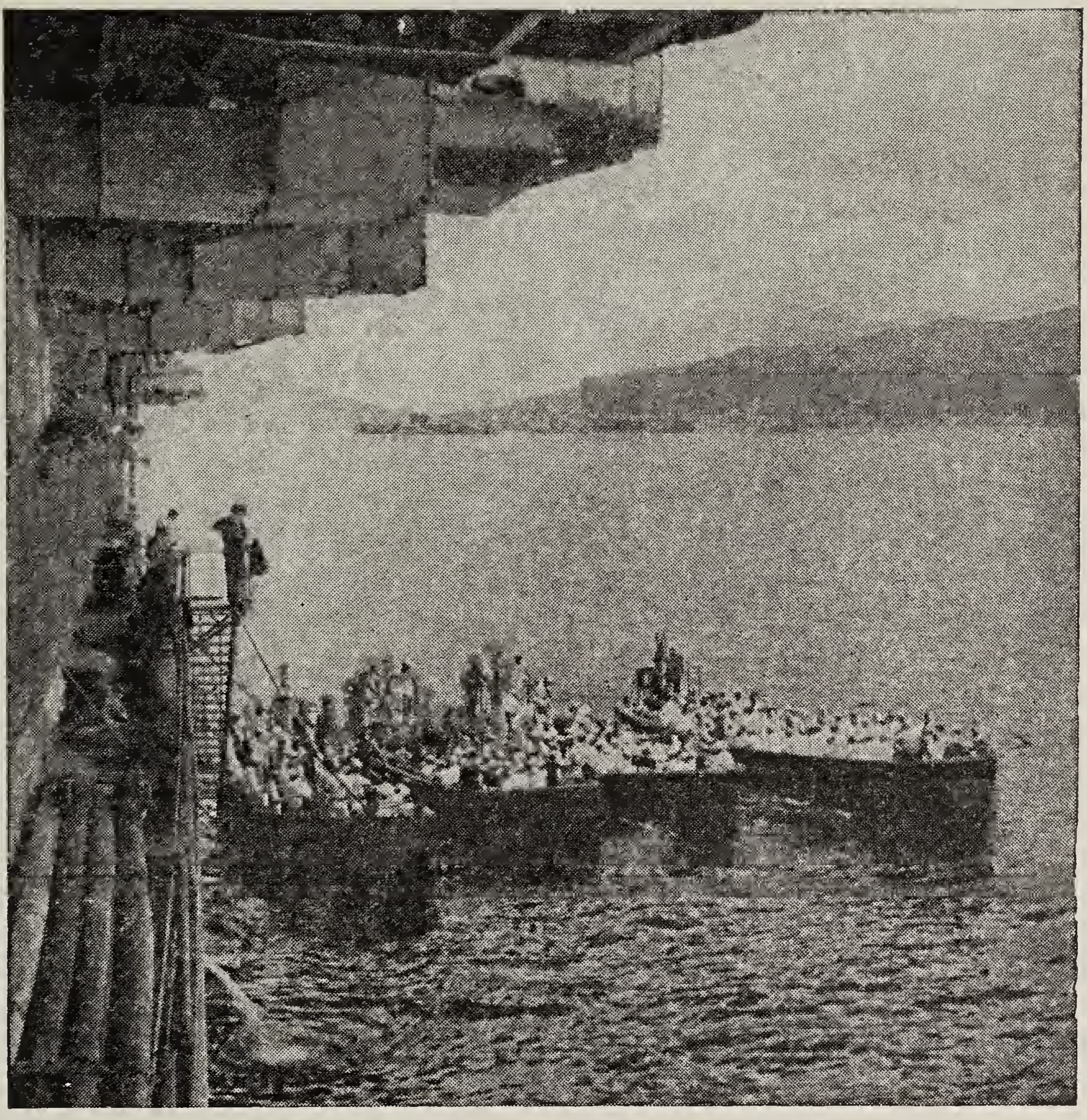
One mechanical type, *gravity davits,* carries the lifeboat on two cradles, mounted on rollers, which move over two parallel tracks at right angles to the vessel's side. In operation, a lever controlling a brake is raised which permits the lifeboat and the entire assembly to roll down the tracks by gravity, stopping with the lifeboat suspended over the side and at the embarkation deck.

Another popular type is the *quadrantal davits.* The lifeboat is carried on chocks under the davits. The davits themselves stand upright, with the tops curved in toward each other so that the ends come directly above the hoisting hooks of the lifeboat. In operation, the boat is raised until clear of the chocks when the hand crank is turned. Then the davit, which is pivoted near the foot so that it will turn in an arc at right angles to the vessel's side, is rotated outboard by means of a crank operating a worm gear, thus suspending the boat over the side. It is then lowered to the water in the usual manner by its falls.

BITTS AND CHOCKS

For the purpose of securing mooring lines, bitts are provided along the ship's length. Bitts are short metal or wood columns extending up from a base plate secured to a deck or bulwark rail.

Chocks through which hawsers and lines are passed, are also provided along a ship's length. Chocks are oval-shaped castings, either open or closed on top, and fitted with or without rollers. This term is also applied to blocks of wood used as connecting or reinforcing pieces, filling pieces and supports for lifeboats. In very high-sided ships the chocks are simply openings in the side with a round beading to prevent chafing lines. Those set on a *weather deck* (a term applied to the upper, awning, shade or shelter deck, or to the uppermost continuous deck that is exposed to the weather) consist usually of two horns with an opening between. Chocks are sometimes fitted with rollers, horizontal, vertical or both, to reduce chafing.



PART 9

BOAT SEAMANSHIP

CHAPTER 39

Pulling Boats

CLASSES

Whaleboats are double ended pulling boats with 5 oars single banked, or 10 or 12 oars double banked. The 24 foot and 28 foot boats are fitted with sailing gear but have no centerboard. The 30 foot boat issued only to large ships is designed especially for sailing and has a ketch rig and centerboard. All whaleboats are fitted with swivel rowlocks and for lifeboat work are provided with a steering rowlock. Whaleboats are used as lifeboats although the open type motor whaleboat is generally preferred.

Dinghies are small handy boats with transom sterns. They are pulled by 3 or 4 men, each with 1 or 2 oars depending on size and design. Because they use few men, they are very convenient for all kinds of light work in port. They carry sails and are sprit rigged.

Racing cutters are lightly built boats, transom sterned, designed for instruction in oarsmanship and for competition. While they are steady and strong for their purpose, they are not suitable for general use and are not provided with sails.

Each boat is furnished with a data plate with exact information upon it similar to the following:

50 FOOT MOTOR LAUNCH
BOAT REGISTRY NO. . . . . MAXIMUM CAPACITY,
190 MEN

(Maximum capacity includes boat crew, assumes all passengers in cockpits and seated as far as possible.)

NAVY YARD, ... OCTOBER, 1943. PLAN NO. . . . .

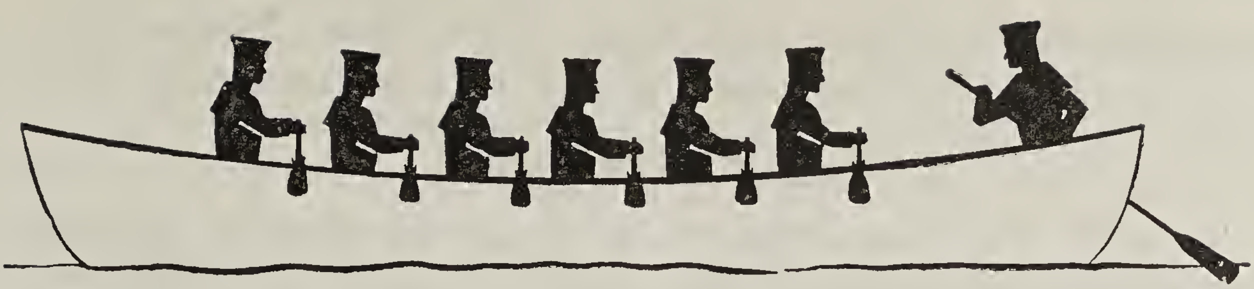
DUTIES OF COXSWAINS

Pulling boats are under the command of coxswains. A brief statement of the coxswain's duties follows:

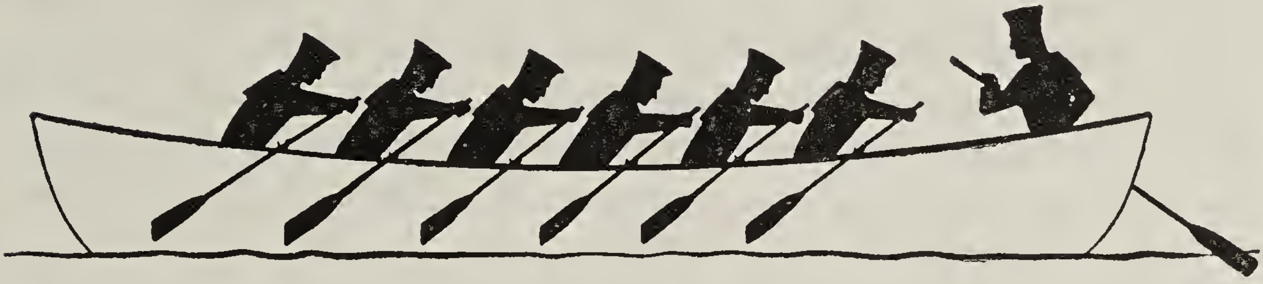
1. See that required gear is in boat.
2. See that boat and gear are clean and shipshape.
3. See that crew is in proper uniform.
4. Maintain silence among the crew.
5. Rise and salute superior officers when they enter and leave the boat.
6. See that proper courtesy is extended to officers by enlisted personnel.
7. See that men handle oars smartly in getting out, tossing and boating oars.
8. Give commands clearly, sharply and distinctly.
9. Require the crew to pull a strong regular stroke.
10. Handle boat properly in heavy sea.
11. Watch the ship for signals.
12. Obey boat recall as soon as made out.
13. See that fenders are over the side when coming alongside a gangway or landing.
14. When under sail see that sails are well set, trimmed and properly tended.
15. See that every duty in a boat is done in a quick seamanlike manner.
16. Supervise the hoisting of the boat, performing the various duties in a proper and orderly manner.
17. Report immediately any damage to the boat or loss of gear and circumstances pertaining to same.

POSITIONS OF CREW

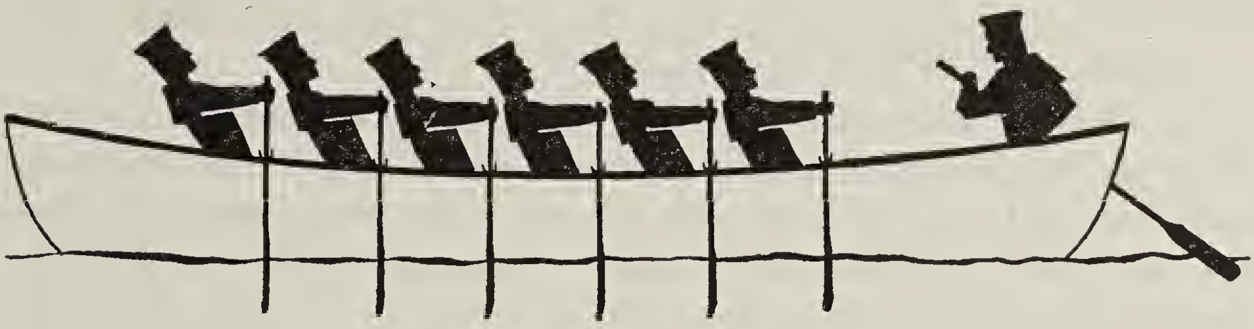
Position No. 1 is the position of *Oars.* The sailor sits erect, eyes astern, oar horizontal. Wrists are down in order to get the blade flat. Position No. 2 is *Stand By to Give Way* (beginning of the stroke). Sailor leans well forward, arms out straight, wrists straight, eyes astern, blade of the oar vertical and just clear of the water, hands in the natural position for a heavy pull. Position No. 3 is the middle of the stroke. The blade enters the water from position No. 2, and the pull up to this time has been made by leaning back. Arms are still straight, eyes astern. Position No. 4 is the end of the stroke. A final pull is made with the arm. The blade is pulled out of the water at the finish. Position No. 5 is the recovery. As the blade comes out of the water, wrists are bent down causing it to lie flat with the water. This is known as feathering the oar. It is always done in order to



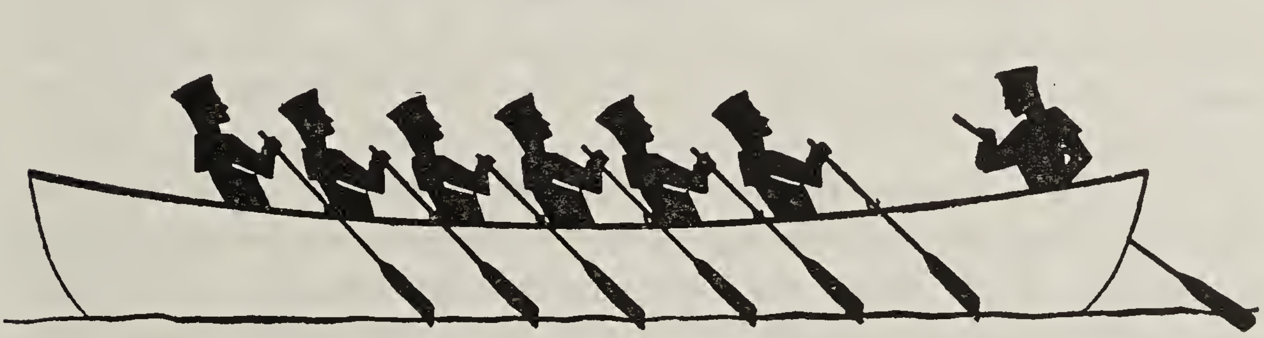
OARS



STAND BY TO GIVE WAY



MIDDLE OF STROKE



END OF STROKE

Figure 39-1.—Positions of crew.

lessen the wind resistance or resistance due to spray. Position No. 1 is now taken, and the oarsman is prepared for another stroke.

BOAT COMMANDS

Stand By the Oars.—Every man except the bowman seizes his oar and clears the blade of other oars. Oars are shoved forward over the gunwhale far enough to bring the handle to the proper position. Blades will be kept clear of the bowman's boat hooks.

Up Oars is the second command.—The oars, except the 2 bow and inboard stroke oars, are tossed quickly to the vertical position, blades trimmed fore and aft in line with that of the stroke oar, handles resting on bottom boards, outboard hand grasping loom of oar at chin height, wrist of inboard arm resting on inboard thigh, steadying oar. The Coxswain reports to the Officer of the Deck that his boat is alongside, ready for duty.

Shove Off.—When orders are given, the Coxswain commands *SHOVE OFF.* Bowmen shove bow smartly away from ship's side with boat hooks, shoving the boat a little ahead if possible. The Coxswain sheers her off with the tiller. Fenders are rigged in by men abreast them. Bowmen place boat hooks fore and aft midships, seat themselves and get their oars ready.

Out Oars.—Thwartmen throw blades of oars horizontally outward, allowing the leathers to fall in rowlocks, place both hands on handle and trim blades flat and directly abeam as in the position of *Oars.*

Give Way Together.—All oarsmen take full stroke, keeping accurate stroke with starboard stroke oar.

In Bows is given as landing is approached while the blades are in the water. Bowmen keep the stroke, toss oars simultaneously to an angle of 45 degrees and boat them together. In that same order bowmen stand erect, face forward, holding boat hooks vertically in front of them.

Stand By to Toss.—The first command given as a warning to the crew. The command *TOSS* is given as the blades enter the water. Upon completion of the stroke the oarsmen toss oars quickly to a vertical position by pressing smartly on the handle with inboard hand, resting the oar with the outboard hand under the loom. They lower handle to bottom board and assume position described in *UP OARS.* The inboard stroke oar lays his oar in the boat quickly after he has it in the vertical position, seizes the boat hook and checks headway and hauls the stern of the boat into the gangway.

Boat Oars.—Each man lays his oar quickly and quietly in the boat, blades forward.

Trail is given when blades are in the water. Finish stroke, release the handle of the oar, allowing it to draw fore and aft and trail alongside.

Hold Water.—Drop the blades in the water and hold them perpendicular to the keel line, blades vertical. If the boat has considerable way, drop the oars in the water with the upper edges of the blades inclined forward and gradually bring the blade vertical as way is lost.

Stern All is given from *OAR* or *HOLD WATER.* The oars are backed, keeping stroke and feathering.

Back Starboard (Port).—Designated oars are backed as at *STERN ALL.*

Point the Oars.—To shove off a boat that is grounded stand facing aft, point blades of the oars forward and downward to the beach at an angle of about 30 degrees ready to shove off at command. If waves lift the stern of the boat, commands should be given as her stern lifts.

HANDLING BOATS UNDER OARS

Approaching a crowded or difficult landing, pull easily and keep the boat under control with the oars as long as possible, boating oars only at the last minute.

Going through a narrow entrance, get good way on the boat and then trail or toss oars.

In pulling across a current, make a good straight line by steering upstream from the point you plan to make good.

Having a long pull against the tide, run near shore where tide is slacker than in midstream and when there is sometimes an eddy.

There should always be a lantern, filled and trimmed, in the boat, and boats should never leave the ship for a trip of any great length without a compass. Weather is liable to thicken at any time, and a boat without a compass would have difficulty in reaching a landing or returning to the ship. For this reason, boat officers and coxswains of running boats should at all times know the compass course between the ship and landing; and if they are away from the ship and it begins to thicken, they should at once observe the compass course before the ship is shut in.

At sea, no boat should ever leave the ship without a compass, water, and provisions, and, except lifeboats, all boats sent away from a ship at sea will carry rifles and ammunition.

Never go alongside a vessel which has sternway or which is backing her engines.

In coming alongside in a seaway or when a strong tide is running, warn the bowman to look out for the boat line which will be heaved from the ship.

If caught in a gale in an open boat, rig a sea anchor by lashing the spars and sails together, sails loosed. Fit a span to this and ride by the painter. If there is oil in the boat, secure a bag full of waste saturated with oil to the sea anchor.

LIFEBOATS

A lifeboat is secured for sea, ready for lowering when in the following conditions: boat at the davits; griped in; falls clear; detaching apparatus ready for detaching at the word; steering oar shipped; oars fitted with trailing lines and ready for getting out quickly; rowlocks shipped and fitted with lanyards; plug in; sea painter brought aboard the boat through the bow rowlock on the side of the boat toward the ship and half-hitched or toggled around the second thwart; lifelines bent to the span; life jackets in the boat and all articles of boat gear in the boat and ready for use.

CHAPTER 40

Power Boats

CLASSES

There are in general two types of power boats used in the Navy: open boats, and decked-over boats.

CREW OF POWER BOATS

Our power boats' crews vary in sizes depending on the size of boats and the type of duties being performed; however, the crew is usually made up of the following members:

1. Coxswain, at tiller.
2. Engineer, seated aft of engine.
3. Bowman, standing on after deck, starboard side, facing forward.
4. Sternman, on after deck, port side, facing forward.

EQUIPMENT OF POWER BOATS

Power Boats are supplied with the following items:

1. Anchor with chain or line bent, ready for use.
2. Bow painter.
3. Stern fast.
4. Oars.
5. Boat hooks.
6. Boat bucket.
7. Breaker with drinking water.
8. Canvas flag bag with necessary flags and pennants.
9. Boat compass.
10. Locker or box for cleaning gear.
11. Fenders.
12. Cushions.
13. Fuel.
14. Deck lantern.
15. Engine repair tools.
16. Life buoys.
17. Life jackets.
18. Running lights, foghorn and fog bell.

19. Grapnel.
20. Sand for extinguishing gasoline fires.
21. Fire extinguishers.

SPECIAL DUTIES OF POWER BOAT COXSWAINS

1. The coxswain is responsible for the discipline and obedience of all men in the boat, crew or passenger.

2. If gas or oil is needed, or if repairs are required, the engineer notifies the coxswain who reports this fact to the Officer of the Deck.

3. A coxswain should, as soon as possible, learn the characteristics of his boat. He should determine the turning circle, effect of his crew under different conditions, maximum speed, operating radius, and amount of gas or fuel required to cover given distance at ordinary speed.

4. Coxswains must know the "Rules for Preventing Collisions."

5. On the first trip in and out of the landing, the coxswain should always use the compass to observe the compass courses. These courses will be recorded for use in case of fog.

POWER BOAT MANEUVERING

Power boat coming alongside.—In landing, approach at slow speed on a course slightly converging with the face of the float or the gangway or a foot or so off. Stop the engine some distance off to permit the boat to coast and be stopped with little backing power.

The bowman and sternman must not let the boat touch the float or gangway while alongside. It is bad seamanship to do so.

When it is necessary to make a landing by rounding up to a heading opposite to the course to the landing, boat should be taken well off from the landing, swung in a large arc, and slowed down before arriving abreast of the float or gangway. This prevents heavy wash which might dash the boat against the float or gangway.

Coming alongside the ship in rough weather, or when there is a strong tide running, a boat always takes a line. It should be secured on the inboard bow and well run forward on the ship. This arrangement permits the stem of the boat to be thrown out or in by a slight touch of the rudder.

When making a landing, remember that a loaded boat always holds its way longer than an unloaded boat. Adjust speed accordingly.

Do not approach a vessel which has sternway or is backing her engines. When such a landing must be made, approach the ship from

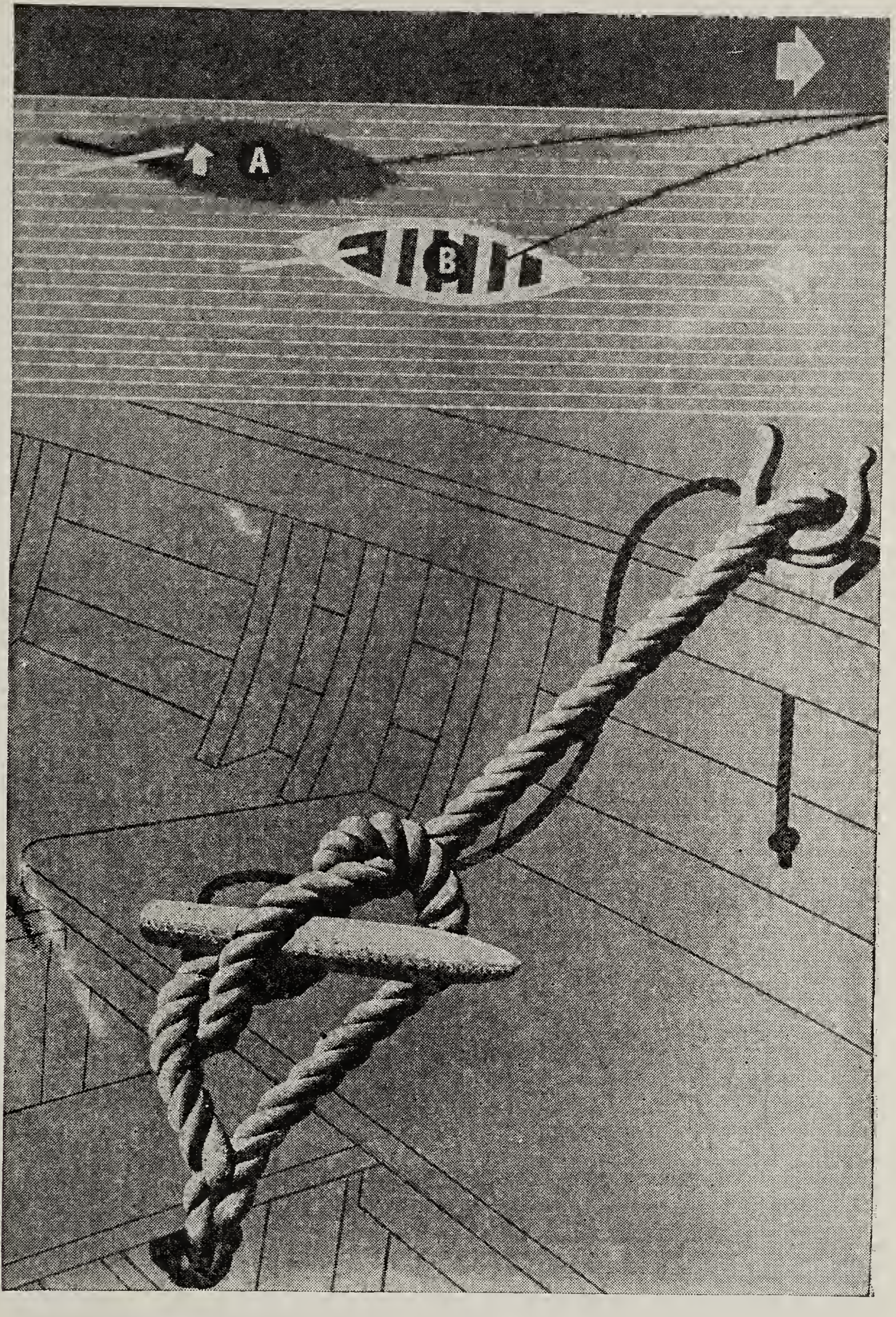
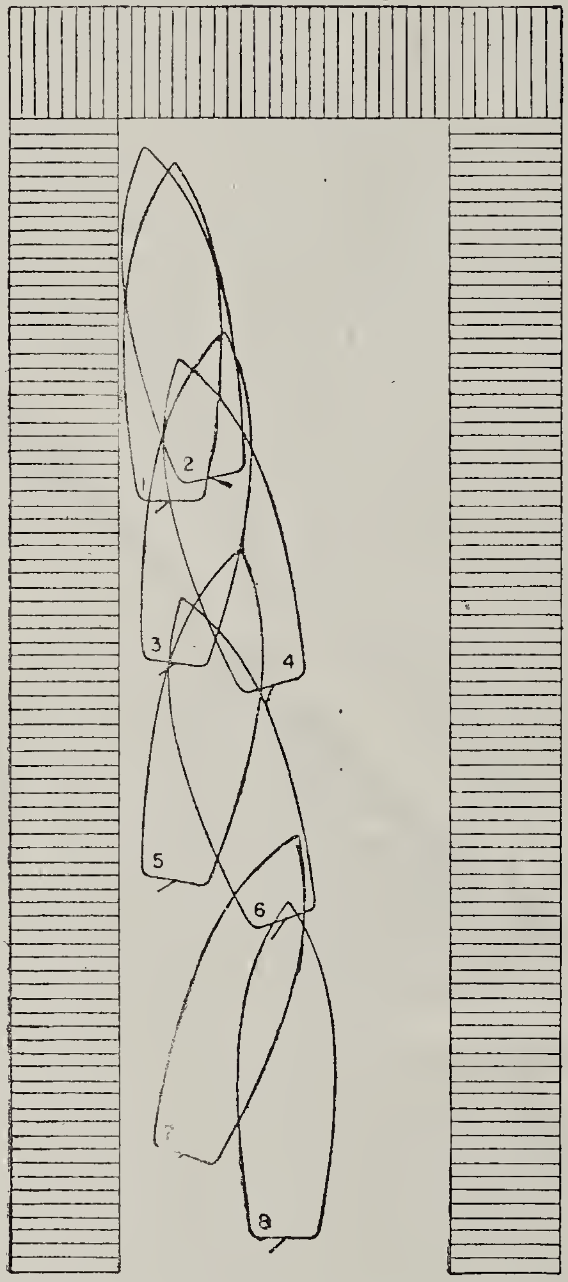


Figure 40-1.—Taking a line in coming alongside ship.

ahead and land bow to stern well forward of the propeller wash.

Backing out of a narrow slip.—(How to back out a boat lying "port side to" which has no room to turn.)

1. Hold a bow spring, go ahead slowly with "full left rudder" to throw stern out.



1. Boat Alongside Dock.
Hold Bow Spring.
Rudder Full Left.
Ahead Slow.

2. Stop—Shift Rudder.
Back Slowly—Let Go Spring.

3. Boat Does Not Back Straight.
Stop.
Shift Rudder to "Full Left."
Go "Ahead Full."

4. Stern Has Swung Out.
Back Full.

5. Ahead Full.

6. Back Full.

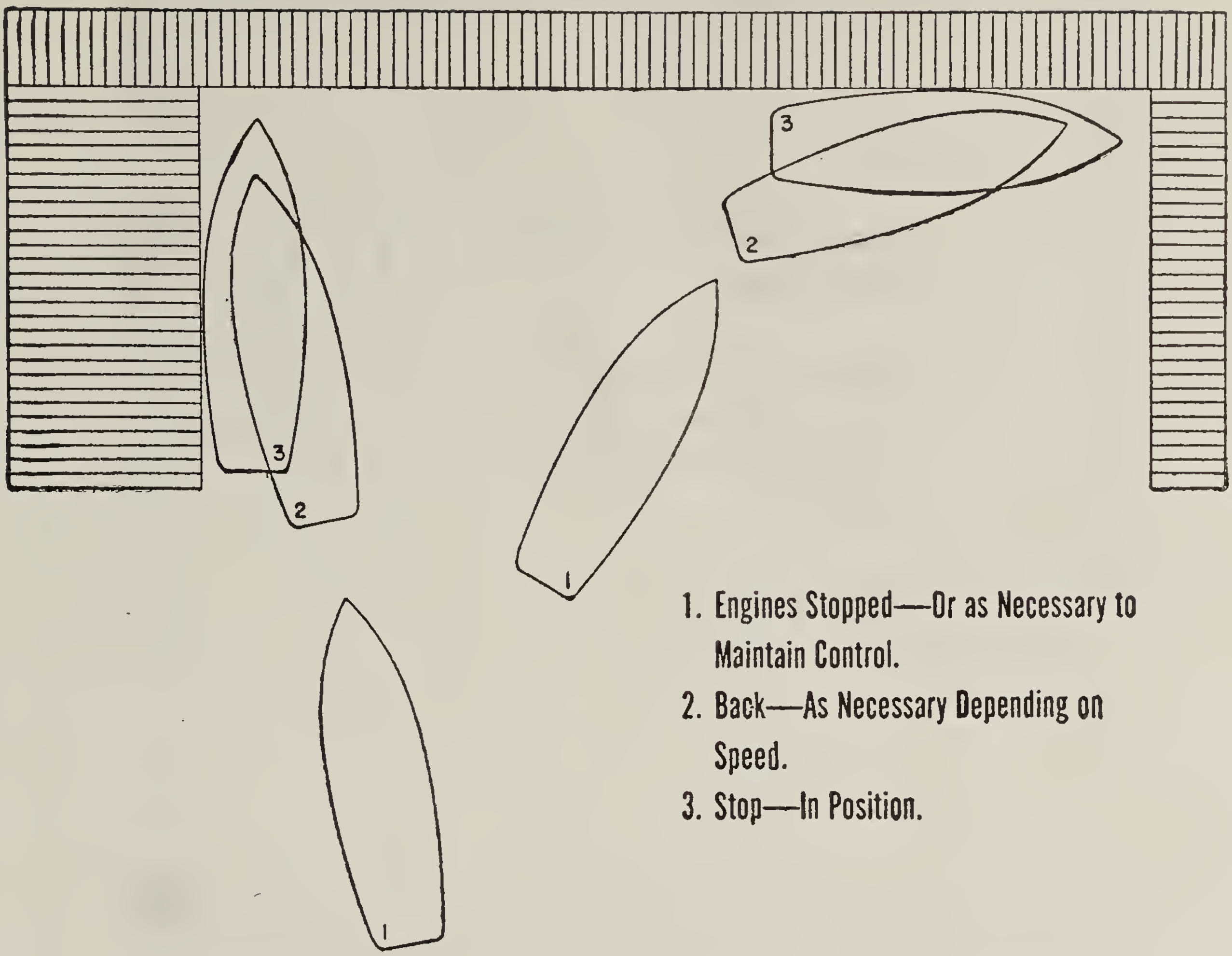
7. Ahead Full.

8. Back Full.
Clear of Slip.

FIGURE 40-2.—Backing out of a narrow slip.

2. "Stop," shift rudder to "full right," back slowly. The boat may back straight or she may not; if not—

3. "Back full" [illegible] far as possible, "stop," shift rudder to "full left," "ahead full," u[illegible] the stern swings then "back full," leaving the rudder left. Co[illegible] this until you are clear.



1. Engines Stopped—Or as Necessary to Maintain Control.
2. Back—As Necessary Depending on Speed.
3. Stop—In Position.

Note: Angle of Approach and Speed Depend on Wind, Tide, etc.

FIGURE 40-3.—Making a landing "port side to."

Making a landing "port side to."—This is an easy maneuver and can be made under almost any conditions.

1. Approach slowly with just enough headway to keep control.

2. Stand in on a small angle to the dock, bow in and stern out.

3. When nearly abreast, "back." This will stop your headway and throw the stern in, place the boat parallel to the dock.

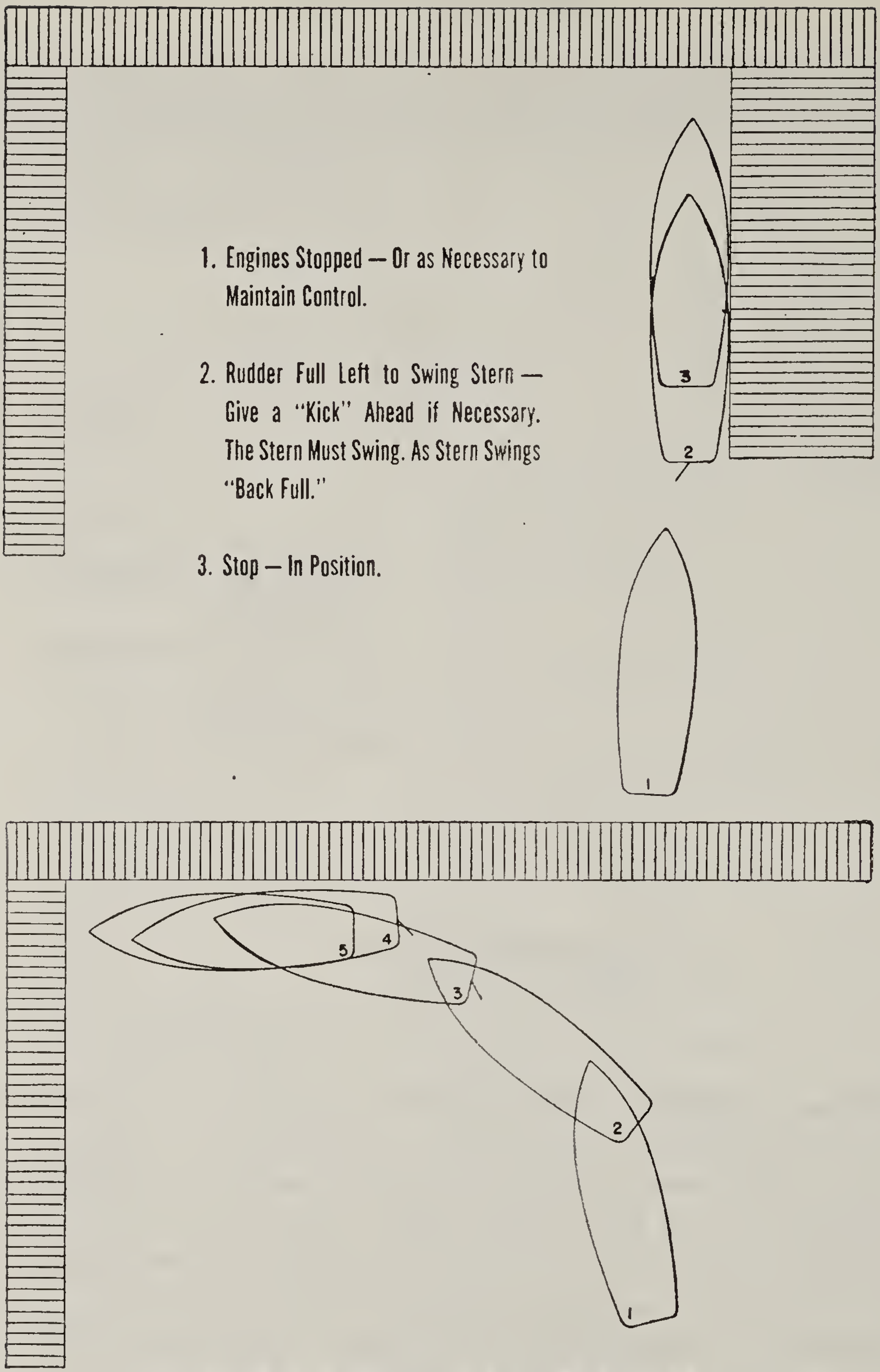
Making a landing "starboard side to."—This is difficult and should not be attempted with too much headway.

1. Approach slowly with just enough headway to maintain control.

2. Stand in parallel to the dock; just before you are ready to "back," put the rudder "full left" to swing the stern to the right.

3. When the stern swings, "back full" and you will be parallel to the dock.

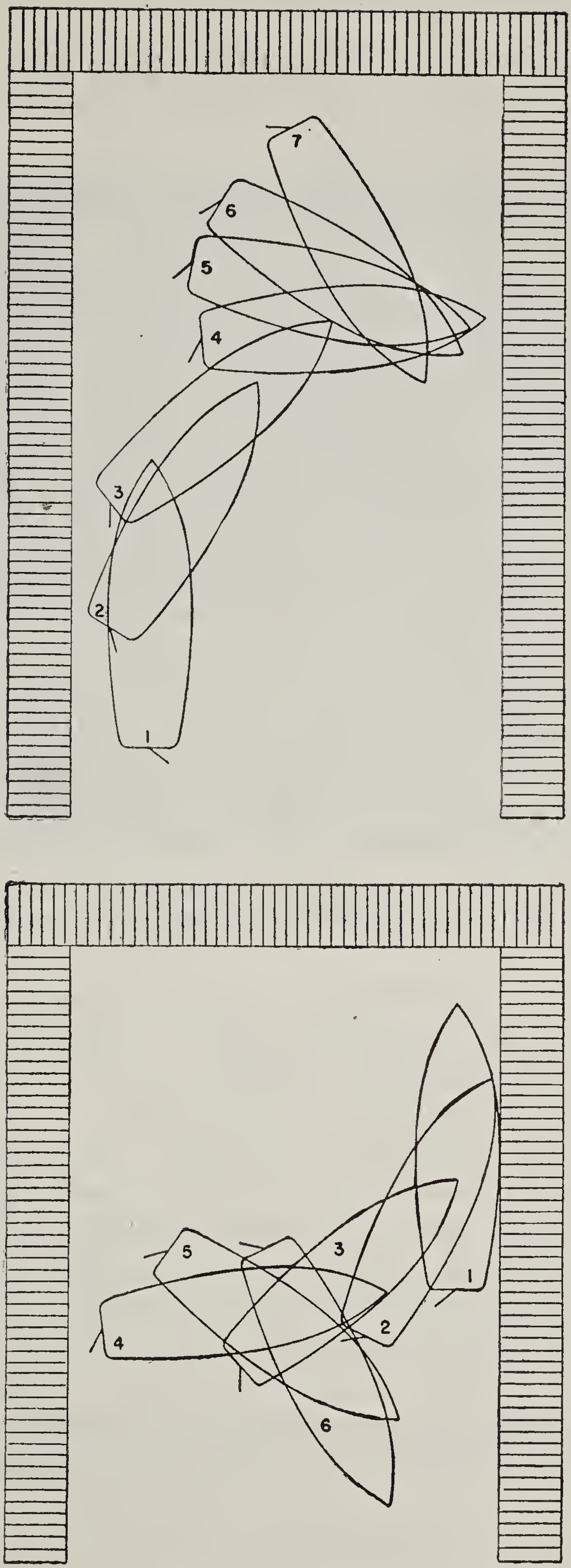
Turning in a limited space.—Always turn to starboard even if some preliminary maneuvering is necessary. Being in position and stopped:



1. Engines Stopped — Or as Necessary to Maintain Control.
2. Rudder Full Left to Swing Stern — Give a "Kick" Ahead if Necessary. The Stern Must Swing. As Stern Swings "Back Full."
3. Stop — In Position.

1. Stand in with enough speed to keep good control and make the turn.
2. It may be necessary to "back" at this point in order to kill some headway but keep the stern swinging.
3. At this point the ship should have very little headway, but should be swinging. A "kick" ahead may be required.
4. Back Full.
5. Stop — In Position.

Figure 40-4.—Making a landing "starboard side to."



1. Ahead Full.
2.
3. Rudder Right.
4.–Back Full.
5.–Ahead Full.
6.–Back Full.
7.–Ahead Full. Turn
   Completed.

Note: Rudder is "Full Right"
Throughout the Turn.

1.–Back Full.
   Rudder Left.
2.–Backing Full.
   Rudder Left.
3.–Stop.
   Shift Rudder to Full Right.
   Ahead Full.
4 Going Ahead Full.
5 Rudder Right.
6 Turn Completed.

FIGURE 40-5. Turning in a limited space.

1. Put rudder "full right," then go "ahead full." Stern will swing immediately to port and will swing more rapidly as headway is gained. Gain as much headway as is safe.
2. "Back full," do not move the rudder. Continue backing until about dead in the water.
3. "Ahead full."
4. Continue until turned. By this means, it is practically possible to turn a boat in her own water.

SAFETY PRECAUTIONS

1. No smoking or naked lights will be permitted in boats.
2. Gasoline will be transferred to a boat only when removed from other gasoline containers.
3. Power boats fuel only when in the water with engine stopped, and where possible near enough to the ship to receive aid in case of emergencies.
4. To avoid danger of ignition of gas from a static spark, the filling hose nozzle is provided with a grounding wire which should be grounded to some part of the tank prior to opening the filling flap.
5. Except in emergencies, boats shall not be fueled at night.
6. Before starting engine, clear boat compartments and bilges of any gasoline vapor that may be present from fueling. This is particularly important with motor boats having closed engine compartments.
7. Bilges and sumps are kept dry and frequently washed out to clear them of gasoline and oil. Forward and after engine-space bulkheads should be inspected for tightness in the bilges to prevent liquid and gas from passing into the adjacent compartments.
8. Electric wiring is not permitted in the bilges. Be careful to reduce sparks to a minimum. All naked electric terminals shall be wrapped with insulating tape. Batteries are charged either on deck or removed to an open space in the boat to prevent hydrogen gas explosions. Gasoline piping has extra heavy joints and seams. Shellac is used in making up the joints. Tank filling caps are kept in place when not fueling.
9. Portable gasoline containers on combatant vessels are stored in the open on weather decks so that they can be dumped overboard in an emergency.

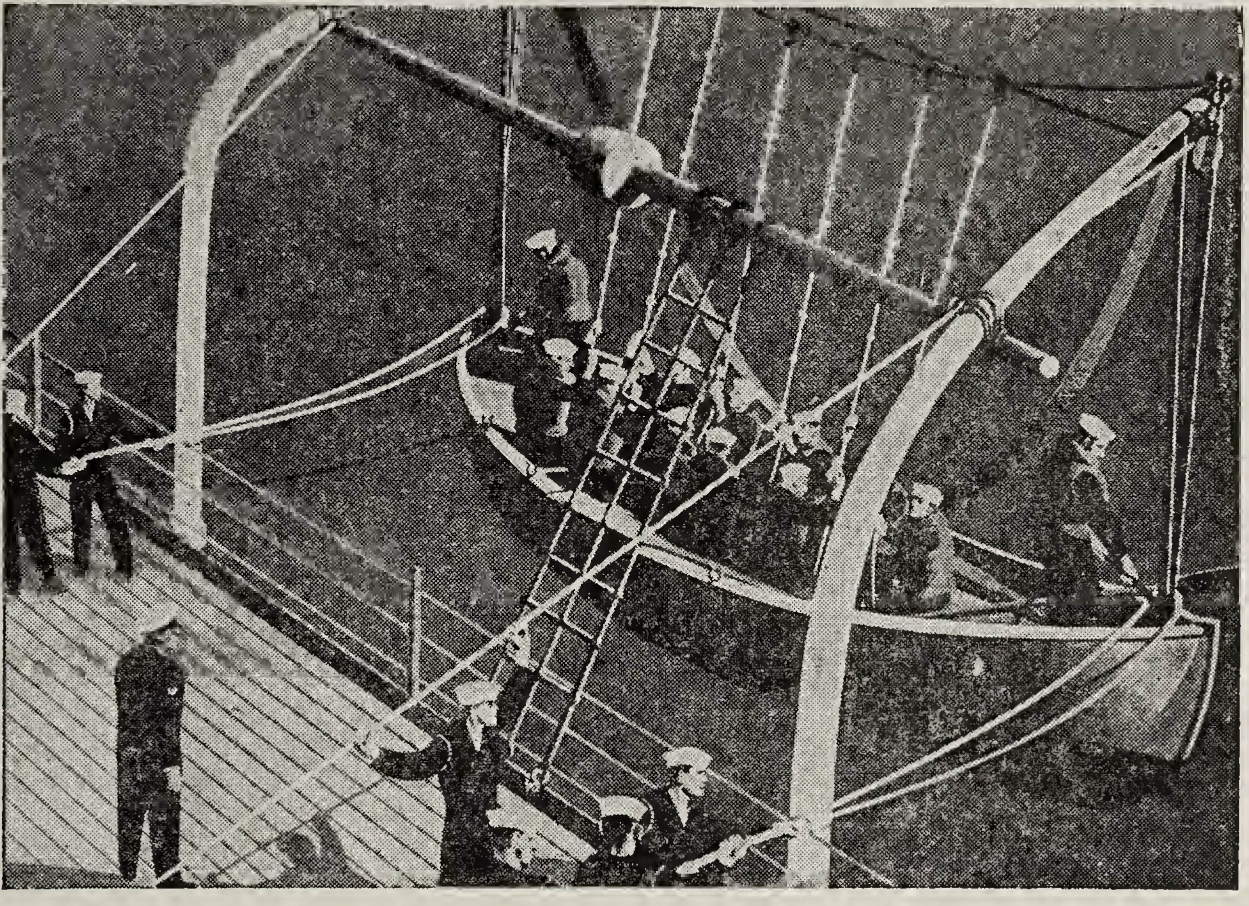


FIGURE 41-1.—Lowering a pulling lifeboat.

CHAPTER 41

Boat Handling

LOWERING BOATS

The boat crew enters the boat. The bowman tends the forward fall, keeping it clear, and unhooks it at the order of the coxswain. The second bowman tends the sea painter. He unfastens it from the second thwart, leading it through the inboard bow rowlock. He takes in the slack and takes a turn around the inboard end of the second boat, keeping the end in hand. This should never be made fast, but should be allowed free movement for emergency use. Second bowman lets go sea painter on order from the coxswain. Stroke oar tends the after fall in the same manner as the bowman. *The after fall must always be unhooked first.* If by error the forward fall is unhooked first, the boat immediately swings out, and if the ship has much way, there is real danger of the boat's capsizing or being smashed against the ship's side. Men stationed at the falls for lowering lower at the command of the officer or petty officer in charge of the activity. They must lower away together; keeping the boat on an even keel. When the boat is near the water, the command *LET GO* will be given. Then boat falls will be thrown off the cleats quickly.

HOISTING BOATS

Bowman boats his oar and stands by to receive sea painter. On receiving the sea painter, he takes a turn around the inboard side of the second thwart; keeping the end in hand. Oars are boated, and the second bowman takes the sea painter while the first bowman stands by to hook the forward fall. The boat is hauled up under the davits by men on deck manning the sea painter. Waist oarsmen keep boat off the ship's side with boat hook. Bowmen hook forward fall first. Stroke then hooks after fall. If ship has much way on, a line will be passed to the stern of the boat which the second stroke will tend by taking a turn around the after thwart. This line will lead well aft on a ship and will prevent the boat from lurching forward as it leaves the water.

Orders used in hoisting.—1. *Avast!* Stop, as "Avast heaving!"

2. *Fore-in-hand.*—Hold running rigging fast temporarily while it is being belayed. This is done to prevent the boat from slipping back by taking turns about the falls with a stopper or binding them against the davits with the body and arms.

3. *Handsomely.*—Slowly and carefully, as to walk back handsomely.

4. *Hoist Away!*—Begin hoisting.

5. *Set Taut.*—To take up slack. This order is given before the order hoist away.

6. *Two Blocked.*—Against the upper block. All the way up.

7. *Up Behind!*—Slack up quickly by moving toward the boat.

8. *Walk Back!*—Return toward the boat with falls in hand. This command is usually used with *Handsomely* to prevent losing control of the boat before the fore-in-hand has been tested.

HANDLING BOATS IN THE SURF

Landing through a surf is an extremely dangerous duty. Lack of skill or inattention on the part of the coxswain is likely to result in loss of life. The safest method is to back in; keeping bow to sea, and every time a sea approaches, pull to meet it with a good headway. Back in as fast as possible after it passes. If this is impracticable, a fairly safe method is to tow a heavy drag over the stern. The great danger of landing through a surf is broaching to. The breaker lifts the stern and forces the bow deeply into the water; thus making the bow a pivot about which the boat swings broadside to and capsizes. Remember that surf when viewed from seaward is very deceptive and is always much worse than it seems. On an open seacoast any surf visible from a small boat would probably be dangerous. If sufficient command can be kept over a boat, avoid the sea if possible so as not to meet it at the moment of its breaking or curling over. Against a head gale in a heavy surf, get all possible way on a boat on the approach of heavy sea which cannot be avoided.

Running before a broken sea to the shore.—A boat when making progress through a heavy surf must stop her progress shoreward at the moment of her being overtaken by a heavy sea and let it pass her.

Heavy weights should be kept out of the extreme end of a boat, but when running before a heavy sea the best trim is deepest by the stern which prevents the stern from being beaten off by the sea easily. A boat under these conditions should be steered by an oar over the stern or on one quarter. Avoid each sea as far as possible by placing the boat where the sea will break ahead of her. On a very steep beach the first heavy fall of broken water will be on the beach itself, while on the very flat shores there will be broken water extending 4 or 5 miles from the land. The outermost line of broken water on a flat shore where waves break at 3 or 4 fathoms of water is the heaviest and therefore the most dangerous. When it has been passed through safely, the danger lessens as the water shoals until nearing the land where its force is spent. On flat shores, whether a boat is lowered in or backed in, keep her straight before, or end-on to the sea until she is fairly aground, when each surf takes her farther in as it overtakes her, aided by the crew who jump out to lighten her and drag her in by her sides. On a steep beach go right in and in the act of landing, whether under oars, sail or power, turn the boat's bow half way around toward the direction in which the surf is running so that she may be thrown on her broadside up the beach.

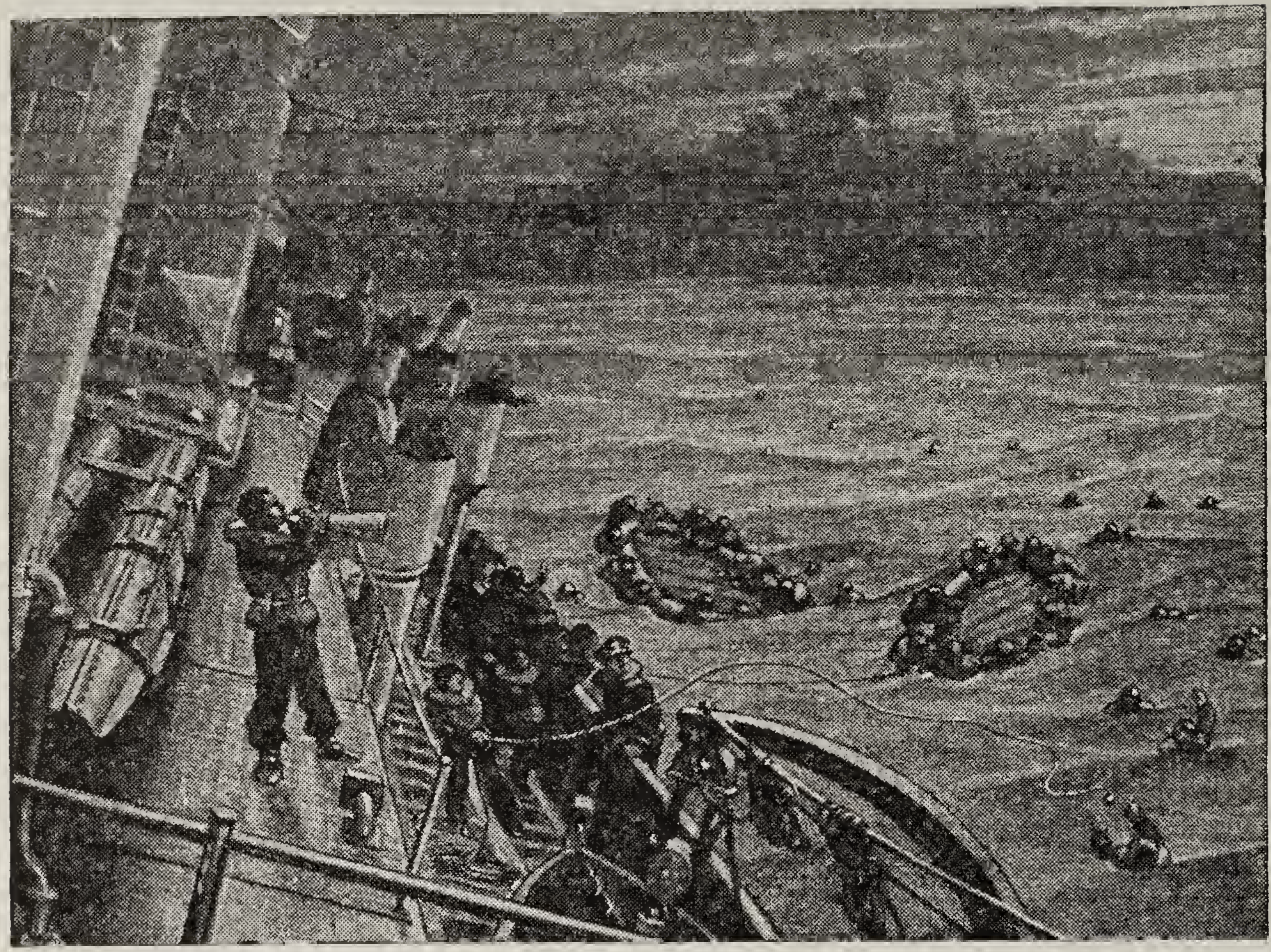


FIGURE 42-1

CHAPTER 42

Survival Adrift

Over the side! The water is filled with debris—covered with burning oil. The ship lists rapidly, settling by the stern. What do you do? How and when do you do it? You can keep among the survivors if you learn a few simple things about abandoning ship right now.

Courage, perseverance, endurance and resourcefulness are on your side. Fear, despair, weakness and lack of ingenuity are your enemies. It is up to you to decide which will triumph. This discussion can not cover all the possibilities—but with the information given here you will have a better chance to survive.

GETTING READY TO GO "OVER THE SIDE"

There are a few important things to do, if time permits before going "over the side."

1. Try to find out the distance and direction of the nearest friendly land.

2. See that your life-saving gear is in first class condition. Your life jacket is your best friend when you are shipwrecked. The clothes you wear, and the gear you take with you depend upon two things: (1) whether you are in a hot or cold climate, (2) whether you are going to be lucky enough to be on a life raft or must depend upon your life jacket to keep you afloat.

The list of clothing given here is based upon actual experience of men who have had to abandon ship.

Abandoning ship in cold climate.—*Clothing.*—1. Long woolen underwear and woolen socks to keep body warm.

2. Wind-proof jacket to protect shoulders and arms which will be exposed to wind.

3. Helmet or watch cap to keep head warm and water out of ears.

4. Avoid bulky clothes that cannot be shed easily. You must not waste energy keeping legs moving in heavy, water-logged clothing.

5. Gloves to keep hands warm and to prevent burning on lines.

What to take.—1. Whistle.

2. Flashlight with a transparent rubber water-proof sheath.

3. Knife.

4. Police whistle.

5. Six foot line tied under arms with snap-on free end, to secure self to life line on rescuing ship.

6. Wallet and money belt.

Actions before leaving ship.—1. Drink hot tea or coffee to ward off effects of cold water, if available and time permits.

2. Test life jacket valves and inflating tubes.

3. Stimulate circulation by deep and rapid breathing and by flexing arms and knees. Do not over-exert.

4. Keep calm.

Abandoning ship in hot climate.—*Clothing.*—Wear a shirt and trousers and tennis shoes. These may be some hindrance in the water, but if you are to be adrift for some length of time, it is necessary for protection of the body against the scorching effects of the sun and salt water. Take the same articles with you and follow the same routine before leaving ship as described above.

GETTING "OVER THE SIDE"

1. Obey every command. Remember that your officers are just as anxious to get out of this fix as you are.

2. Wear your life jacket and fasten it securely.

3. If possible, lower yourself by ladders or lines. If you must jump, jump feet first, protecting your face with your arms. If you wear a kapok jacket, be sure to hold it firm and see that the lower drawstring is secure so that it does not strike your head when you hit the water. If you have a cork life jacket, throw it over first and jump after it. If you have a pneumatic rubber jacket and are a good swimmer, don't inflate it until you are in the water and have swum a good distance from the ship.

4. Avoid debris in the water.

5. If possible, jump to windward from the lowest part of the ship, or from an overhanging structure. Avoid the fins of the ship, and if propellers are still turning, leave by the bow.

6. If the water is covered with burning oil, discard your life jacket and swim under water. Remember that both the burning oil and the ship will drift down on you faster than you can swim if you swim to leeward. So swim into the wind. See Part I, Chapter 7, for instruction on Swimming in Burning Oil.

7. Swim rapidly away from the ship for at least 100 yards, then climb aboard boat, raft, or wreckage to protect yourself from underwater explosions. If none of these are available, you are less likely to be injured by explosion if you swim or float on your back.

IN THE WATER

1. Tie rafts and nets together. It is easier for searchers to find a large group of survivors than two or three adrift alone.

2. Able-bodied men stay out of rafts and hang on the side. Ropes on raft should be sufficiently loose to permit an easy grasp.

3. Do not swallow water; salt water will make you sick.

4. If the sea is rough, breathe as in swimming, inhaling through the mouth, exhaling through the nose as a wave washes over you.

5. Do not try to swim if raft or net is available. Save your strength.

6. Keep kicking your legs and moving all parts of your body to prevent numbness, which will strike in thirty seconds of inactivity in cold water.

7. Beware of drowsiness which often comes on between 15 and 45 minutes after you enter the water. If others become drowsy get tough with them. Make them do the same with you if you feel it coming on.

8. Shivering saps strength quickly. Deep, rapid breathing and moving the arms and legs will usually stop it.

9. Non-swimmers are most likely to lose their heads. Encourage them and keep talking it up.

10. Stay calm. If you are in a panic, you are more than half way to being lost. If you keep your wits about you, you will come through.

ADRIFT IN A BOAT

As a matter of fact, make the most of the available equipment. If you are in a power boat and there is any fuel use it to obtain the maximum mileage. The slowest speed you can make with the clutch fully engaged will make best use of your fuel. If the boat is fitted for sails and the sails are in the boat, use them. If not, use every bit of ingenuity you can to rig a jury mast and sail; this can be done with gear such as oars, boathooks and pieces of wreckage. Clothing or tarpaulin can be used for sails.

The best possible situation under the circumstances would be to have a boat equipped with sails, a navigator in the crew, a chart, boat sextant and chronometer in the boat. The most difficult situation would face you in a rubber life raft with no means for rigging a sail. In this case the efforts of the crew should be directed toward saving rations. The longer life can be maintained, the more certain that rescue will be accomplished or that landing can be made.

Ocean currents and winds.—Whether you are in a large motor launch or rubber life raft, the most important influences over your movements will be the ocean currents and winds. Currents follow a set pattern depending upon the section of the ocean in which you are adrift. In the North Pacific and North Atlantic, there is a wide band of current under the trade winds, setting westward. Trade winds south of the Equator also nourish a westerly current. In between there is a calm current known as the "doldrums," in which eddies and a weaker westerly current exist. If your boat is in the trade wind belt of the Atlantic, it will eventually drift into the West Indies or the

Caribbean Sea. If it is in the Pacific it will eventually drift into the area of islands controlled by the Japanese. In the Atlantic the northern current changes its set to the northward out of the Caribbean and becomes the Gulf Stream, and circles to an easterly set in northern latitudes. In the Pacific it becomes the Japan Stream. The motion is thus clockwise, covering that part of the ocean north of the Equator. In the South Atlantic, South Pacific and Indian Oceans a counter-clockwise circulation takes place.

Wind and current do not necessarily move in the same direction in a given area. If the current is carrying you in the right direction, but the wind is unfavorable, a sea anchor or drag will increase the effect of the current. If the wind is favorable, the boat may be lightened, everyone may sit up straight to catch the wind, and any sort of makeshift sail may be used.

Using the sun for direction.—Finding the direction to steer for a chosen course without a compass is harder than determining the course. The sun may be used, if it is recognized that the sun's path shifts from one side of the Equator to the other during the course of the year. Knowing the time of year, and your approximate latitude, the amount the sun is off from true east on rising can be estimated.

In using the sun for direction the imagination must play a large part. Consider first, your latitude, second, time of year and the approximate location of the sun's path. By imagining yourself at the extreme position of the nearest pole and the sun's appearance there, then moving toward your latitude, the amount the sun will rise or set off true east and west can be estimated. This estimate is crude but is better than using the sun itself as rising true east and setting true west. In high latitudes the error can be very large and completely upset the more accurate direction determination available by using the stars at night. The moon cannot be used in such an estimate unless the days of its extreme path positions are known.

Determining time of noon.—If you have some navigation equipment, a rough determination of local apparent noon may be needed. The shadow of an upright stick, mast or stanchion can be observed while the sun is reaching its zenith, each observation being taken when the boat is close to being on an even keel. As the object's shadow shortens, a mark is placed at its position and simultaneously either the chronometer's time is noted or a sight is taken with the sextant. The point of the shortest shadow is the instant of local noon.

Gaining direction from the stars.—For practical purposes, consider the earth as a sphere, located at the center of a larger sphere, the inside surface of which is the sky. The stars appear to be fixed and for our purpose may be considered so. They always appear in the same pattern and one may be located by its position in relation to the others.

Planets can be mistaken for stars, but they shine by reflection from the sun, and this light is steady. Stars shine by their own light and twinkle. The sun, moon, Venus, Jupiter, Mars and Saturn move across the heavens at irregular rates on independent paths shifting from roughly 24° north to 24° south of the equator.

The navigating aid to be taken from the stars is that of direction—as a substitute for a compass. As the compass points north and other directions are taken from it, the North Star, Polaris, can be used to estimate any direction desired.

With only a sextant or a homemade substitute, the star Polaris can be used to bring a boat to landfall, if the land is large enough to provide a margin for error. By keeping the star on a determined relative bearing a course very close to true course can be steered. Each

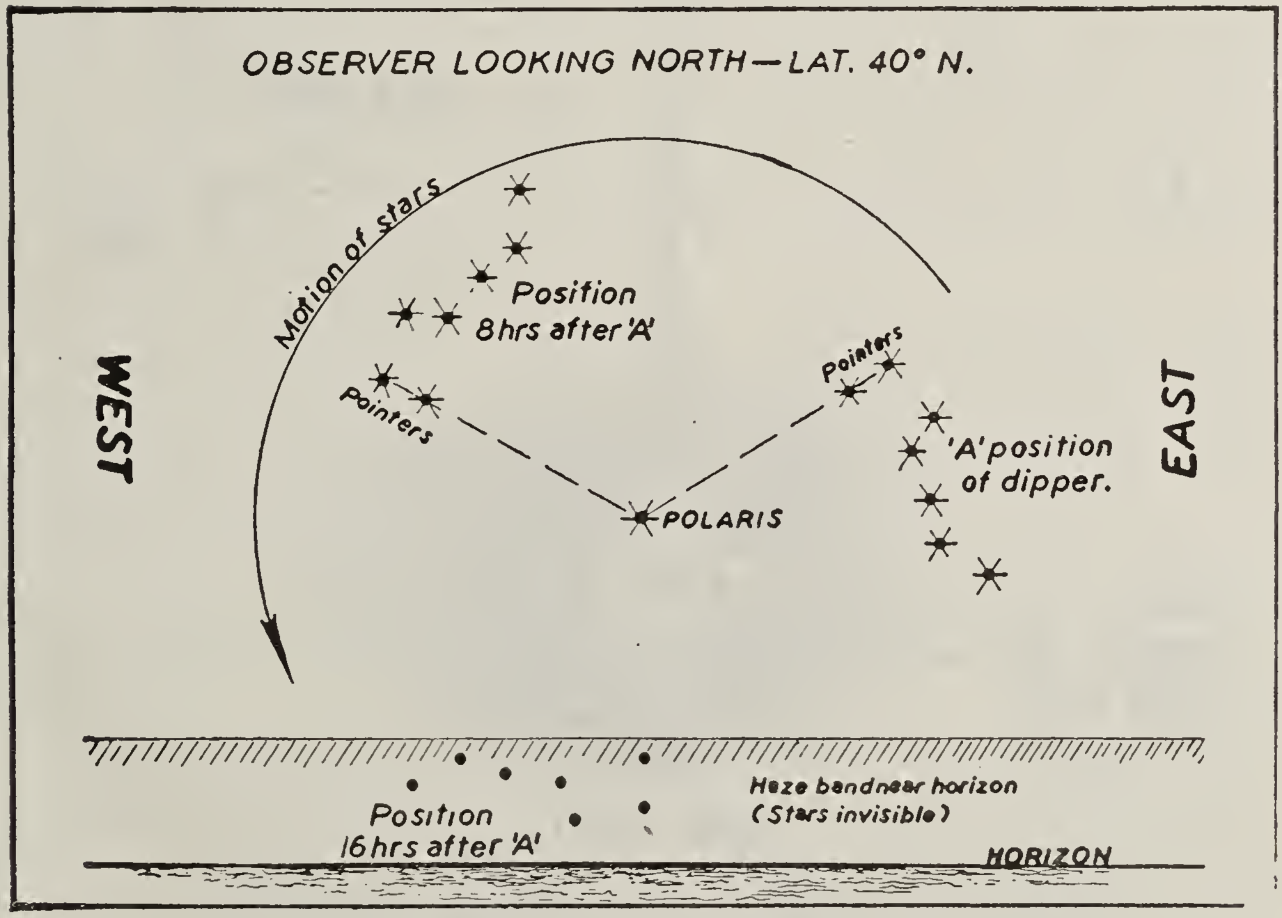


FIGURE 42-2.—Locating the North Star.

evening and morning the sextant altitude of Polaris is taken and is accepted as the true latitude of the boat at the time of the sight. The procedure is to steer north or south until the latitude of the landfall is reached, and then to steer east or west until it is made. As this method provides no way of finding longitude, a close watch for land should be maintained.

In the Southern Hemisphere Polaris is not visible. There the Southern Cross is the most distinctive constellation. The Southern Cross is not above the South Pole, as Polaris is above the North Pole. The point above the South Pole has no visible stars at all and is so

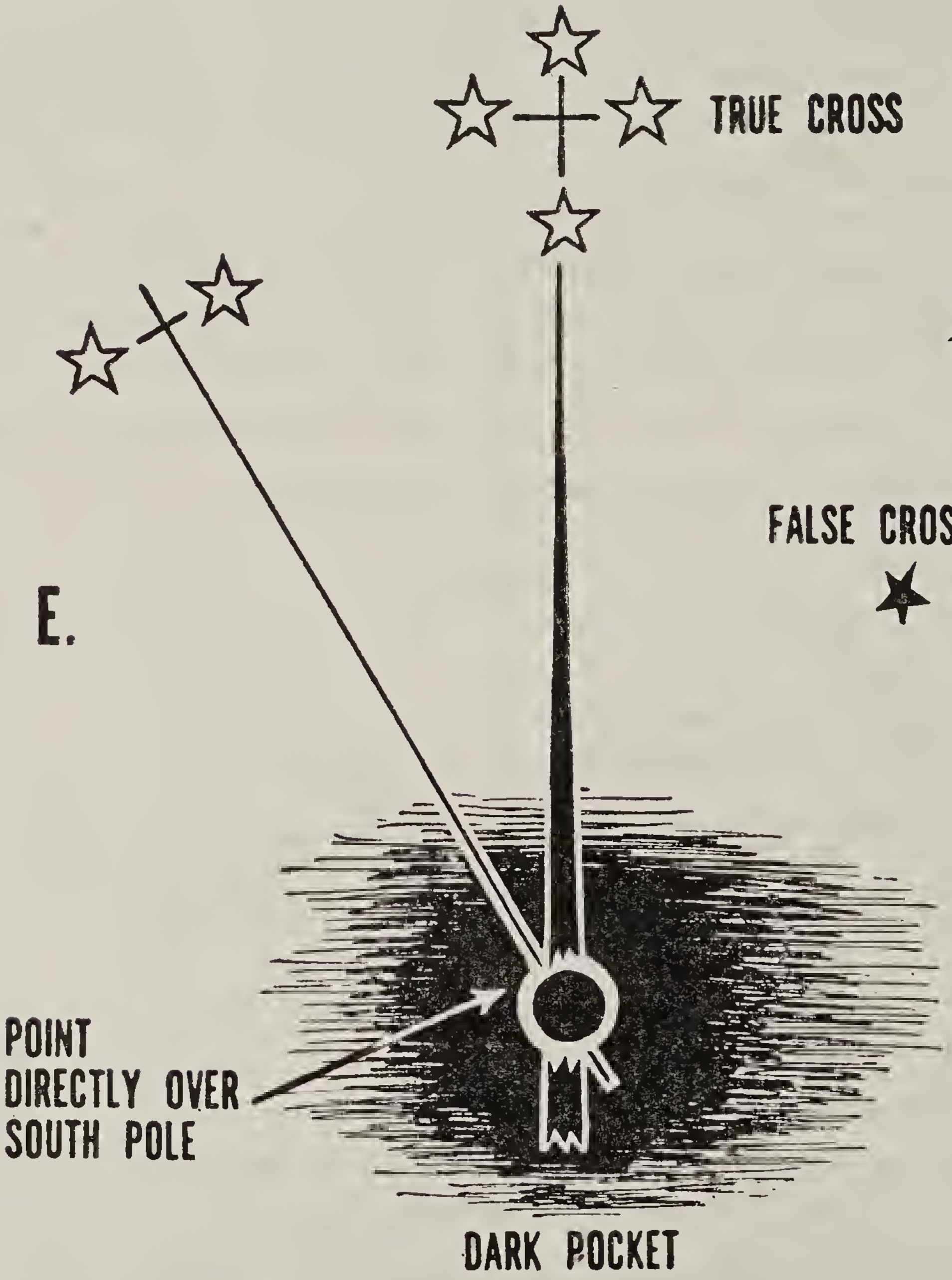


Figure 42-3.—Finding true south from the Southern Cross in the Southern Hemisphere.

dark in comparison with the rest of the sky that it is known as the "Coal Sack."

The figure shows the true Southern Cross, the False Cross (five stars dimmer than the true Southern Cross), and two very bright stars just to the east of the Southern Cross.

Extend the long axis of the Southern Cross to the south, connect the two bright stars with a line, and bisect this line with one at right angles. This imaginary line crosses the imaginary extension of the axis of the Southern Cross in the "Coal Sack" at a point directly above the South Pole. When you have located the point you may use it for steering a true course, just as Polaris may be used in the Northern Hemisphere.

The most outstanding group of stars in the heavens is that around the constellation of Orion. Once pointed out and identified, it is as easy to recognize as the Dipper. Four brilliant stars are placed to make a regular parallelogram. In the exact center are three bright stars, in line, called "Orion's Belt." The northernmost of these is exactly on the Celestial Equator and is the only bright star so placed. Orion, whenever it can be seen, rises above a point on the horizon due east of you and sets due west of you. It will pass directly overhead if you are on the Equator. It will pass north of a point directly overhead if you are in south latitude, or the reverse if you are in north latitude.

Open boat information.—1. Secure loose gear of all kinds to the floor of the raft or boat. Any equipment not lashed down stands a good chance of getting lost.

2. As soon as possible squeeze out and dry wet clothing, but avoid exposure. Take special care of your feet. Remove and dry shoes and socks, if worn. Your feet should be kept dry and covered if possible. If your craft is wet, keep your shoes on, but if you notice your feet swelling, remove them.

3. Rig a tarpaulin or sail, if you have one, as a canopy to protect you from the sun. Protection from the sun is particularly important in the tropics because of the danger of painful burns and increased thirst.

4. Take a careful stock of provisions of water and gear and store them where they will be safe. Plans for rationing food and water should be made but crew members should not eat or drink during the first 24 hours. Stow your signaling gear—mirror, marking dye, flares, signaling pistol—where you can get it quickly. It may be that you will have only a few minutes for signaling a rescue plane or ship.

5. Don't get excited and don't rush. Seconds and minutes are of little importance on a life raft or boat. Do things deliberately and slowly; you will not only save energy which conserves your body fluids, but you will also save yourself unnecessary wettings. Rafts tip over easily.

6. Save your clothes. If you are in a hot climate you may be pretty warm during your first day, but remember that though you may be too hot during the day your clothes will protect you from the cold during the night. By wetting them periodically during a hot day you cut down perspiration. Every time you perspire you lose valuable body moisure that can be replaced only by drinking liquids.

7. Stay in the shade and keep your arms, head and legs covered. This will keep thirst to a minimum and mental and physical efficiency at a maximum. Sunburn and dehydration can kill a man.

8. Thirst will be your biggest problem. A man in good physical condition can live from 20 to 30 days without food, but without water he can only live about a week and a half. Stretch your fasting period, if possible into the third or fourth day. After that, ration food and water. Don't eat much food; it increases thirst. Then make the most of your water by keeping it in your mouth as long as you can, gargle it, and moisten your lips before swallowing. Save enough of your daily ration for a sip just before you settle down for the night.

9. When it rains, arrange your tarpaulin or sail to collect water in large puddles. After the first few minutes dump the first water that has collected—it will probably be brackish from the coating of salt on the cloth—start collecting more. Before filling whatever containers you have, drink all you can comfortably hold. Your body can store water and it makes a better container than a bailing bucket or a tin can. Each quart of water in your body is worth several quarts stored where they may be lost or spoiled.

10. Don't drink sea water. Salt in water saps body moisture. Instead of quenching your thirst, it will make you thirsty.

11. Periodic dunkings will help you reduce your thirst; go over the side slowly to keep the water out of your mouth. There is just one dunking precaution—in the tropics you can get a sunburn even though your body is under water.

12. Don't drink urine. It is poisonous and will only decrease your resistance and increase your thirst.

13. Don't drink liquor. It will nauseate you.

14. Don't eat if you have no water. Digestion uses up your body fluids.

Fishing.—Fish provide both food and drink. Flesh of fish caught in the open sea, cooked or raw, is healthful and nourishing.

Rules for fishing.—

1. Never tie line to fingers, hands, or feet, or boat. A big fish can cut or break your line or carry off your tackle. Don't pay out all your line but leave slack in the boat. Have someone hold the end of the slack line.
2. Don't lean over the side of the boat when a fish is hooked. A boat can be capsized in this fashion.
3. Try to catch small fish rather than big ones.
4. Keep the bait moving to make it look alive.
5. Keep a part of any bird or fish you catch for bait.
6. Clean hooks and lines of fish and fish slime. Dry them in the sun, keep them dry.
7. Don't get your lines tangled or let hooked fish tangle them. Two men can fish at the same time but they must be careful.
8. In a rubber boat, be careful that your knife and fishing hook never get a chance to prick, stick or make a hole in your boat—letting the air out and water in.
9. Make a fair division of your catch.
10. Keep fishing. You never know when fish may bite.

Fishing with a light.—Fish will come to a light at night. Often a bright moon or flashlight shining on a cloth will draw fish.

Notes.—*Dried fish.*—To dry fish cut in thin narrow strips and hang in the sun. If well dried, it will stay good for several days. To dry small fish, a foot long or less, clean, remove backbone and cut slits across the inside about a quarter of an inch apart. Hang them in the sun. Fish not cleaned will spoil in half a day. Clean your fish and eat or dry them without delay.

Birds.—All birds are good to eat, cooked or raw. Their blood and livers are edible. Catch every bird you can. Save the feathers. They make good fishing lures. The meat and guts of birds, and even the toe, make good bait. You can sometimes catch birds in nets. Larger birds will often take a bait of fish on a hook trolled or dragged on top of the water. They will often come after a piece of fish tossed into the air.

Poisonous fish.—When you catch fish near the shore, watch out for three kinds that are poisonous. One, the parrot fish, has large teeth like a parrot's beak. The porcupine and puffer fish will swell up like a balloon if you scratch them on the belly. You can use them as a bait, but don't eat them.

Whales.—Don't worry about whales. They will do you no harm. Knocking two pieces of metal together under water will often scare them away.

Standing watches.—If there is more than one man on a raft or boat a routine of watches should be established so that one man of the crew will be on the alert at all times.

AFTER LANDING

To get water after landing, dig a hole at low tide just below the high water mark. The water may be salty and discolored, but can be used. Drink moderately the first day, or it may make you sick.

On jungle islands, water may be found on the leaves of air plants growing in the trees. Strain out bugs and wigglers. Standing fresh water anywhere in the tropics can be dangerous. Boil it if you can before drinking it. Where there are no people, running water is usually safe.

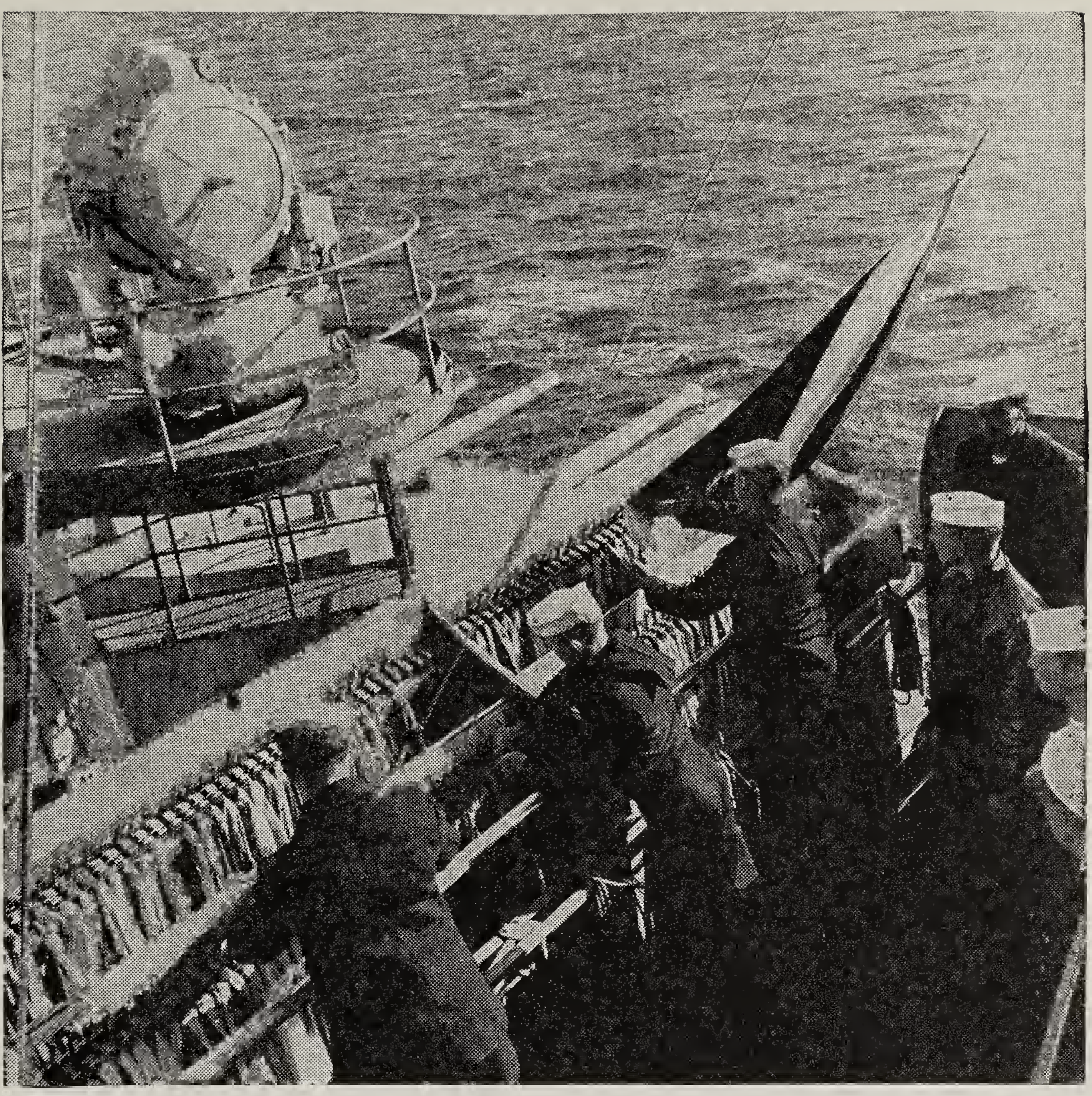
Turtles.—Turtles come ashore at night to lay their eggs, which are a fine source of food if the nest can be found. Follow the trail of the turtle across the sand to find where the eggs are buried. Eat them cooked or raw. Bite a hole in the shell and squeeze. To turn a sea turtle on land, catch it by the shell near the hind leg and lift forward. Once turned it cannot get away.

Plants.—Most tropical fruits are good to eat. At the very top of many palm trees is a large tender bud or cabbage. Cut it out and eat it raw or cooked. Rattans, long slender vines with curved thorns, are also good. Cut them out and eat them. The thick stem of a growing bamboo holds drinking water. Bamboo sprouts up to a foot high can be eaten raw or boiled. Coconuts are delicious.

It is safe for human beings to eat the same things that monkeys eat.

Birds and animals.—All animals are safe to eat, but be careful about poisonous snakes. Snakes taste like fried frog legs or the white meat of a chicken. Grubs and grasshoppers make good food. Pick off legs and wings before cooking. Do not eat caterpillars.

Remember that your chances of rescue and survival depend on using your eyes, ears, nose and brain. The material given you in this chapter suggests a few ways to keep alive. But the best advice of all is "Don't Give Up."



PART 10

COMMUNICATIONS AND SIGNALING

CHAPTER 43

Types of Communication and Methods of Signaling

IMPORTANCE OF COMMUNICATIONS

Communications are the vital means by which a far-flung organization like the Navy can be closely knit into a composite fighting unit. The Naval Communication Service enables our High Command to receive information with regard to enemy strength, movement, and intentions, and also with regard to the location and readiness for action of our own operating units. Through this service orders may be given which when carried out by all concerned will result in successful Naval operations.

TYPES OF COMMUNICATION

The methods ordinarily available for sending and receiving messages may be subdivided into:

1. Long-range radio.
2. Short-range radio and visual.
3. Submarine cable and land line.
4. Mail.

Cable and land line (telephone, telegraph, teletype, etc.) are widely used for communication between shore stations, and afford more security than long-range radio.

Short-range radio (usually voice), and visual methods are the standard means of exchanging short messages, orders and reports between ships which are in sight of one another.

For matters not requiring immediate action various types of written communications are used by the Navy. Some of these are airmailgrams, speed letters and ordinary letters. Preparation of messages for these systems is the work of yeomen and the communications officer. The non-rated seaman does not have to be familiar with the fine points of handling written messages. However, he must be able to understand messages transmitted in this way.

COMMUNICATION NOMENCLATURE

A knowledge of communication terms will enable the bluejacket to "speak the language" of communications. Knowledge is a source of assurance, and knowing these terms, the bluejacket will more quickly feel at home on the signal bridge.

Acknowledge.—An order or request conveyed in a procedure sign directing the addressee to inform the originator that a specified message has been received and is understood.

Acknowledgment.—A seperate message from the addressee informing the originator that his message has been received and is understood.

Addressee.—The authority to whom a message is directed by the originator. This term includes both action and information addressees.

Addressed to.—This term denotes that the authority indicated is required to take all necessary action to carry out the purport of the message.

Action addressee.—The authority (authorities) required to take such action as is necessary to carry out the purport of the message.

Answer.—A procedure signal transmitted by a station indicating receipt of a call and directing or requesting the calling station to transmit or wait.

Dip.—Signals are said to be at dip when the top of the top flag of the signal is about one-fourth of the way from being two-blocked.

Dispatch.—Any message other than a signal or a procedure message. Dispatches may be classified according to means of transmission as radiogram, cablegram, telegram, basegram, and mailgram, but all five methods may be involved in the delivery of the same message to different addressees.

Information addressee.—The authority (authorities) to whom the originator directs the message for information only.

Message.—A communication expressed in brief form. The term embraces dispatches, signals, and procedure messages. The term "message" is often employed as a synonym for "dispatch" in these instructions and in other official publications.

Originator (origin).—The authority who orders a message to be sent.

Procedure.—The rules for the conduct of the transmission and reception of rapid communications, embracing the form and manner in which messages are handled.

Procedure sign.—A letter, figure, or combination of letters and figures, or both, designed to facilitate the conduct of rapid communications.

Procedure message.—A brief communication between operators employing prescribed procedure, and essential to traffic handling or station operation.

Receipt.—A procedure signal made by the receiving station indicating receipt of a message.

Receiving station.—The receiving station is the station by which a message is actually being read.

Reply.—A message originating out of, pertaining to, or replying to a question asked in a prior message.

Signal.—A message the text of which consists of one or more letters, characters, signal flags, visual displays, or special sounds, with prearranged meanings.

Station.—A station is any place where messages are sent or received, regardless of whether it is ashore or afloat.

Tactical signals.—Signals that prescribe a course, speed, or formation, or sudden changes in any or all of these.

Transmitting station.—The transmitting station is the station by which a message is actually being made.

Two-blocked.—Signals are said to be two-blocked when hoisted to the full height of the halyard.

Visual communication duty.—A ship having visual communication duty for a nest or group of ships in close company is considered as the communication office for the group, insofar as visual communications are concerned. That ship shall answer, receipt for, and deliver all visual traffic addressed to the group, and shall transmit all visual traffic originated within the group.

COMMUNICATION PUBLICATIONS

Communication Instructions.—This is a publication containing general instructions for Naval communications, and prescribes details for the transmission of signals and dispatches by that means. This publication is always available to the signalman on the signal bridge, and should be referred to by him when in doubt, or for matters of information.

General Signal Book.—This book contains signals which are essential to maneuvering, fighting, and administering the fleet. It contains signals for the use of all Naval units and includes signals contained in the *Auxiliary Vessels Signal Book.*

U. S. Navy Call Book, Part II—Visual Calls.—This is a list of all Naval calls prepared by the Chief of Naval Operations.

International Code of Signals.—Contains signals for use between men-o'-war and merchant vessels or two merchant vessels of the same, or different, nationalities.

List of Merchant Vessels of the United States.—A book listing the name, owner, builder, tonnage, and other pertinent data, of all merchant vessels under United States registry.

Lloyd's Register of Shipping.—A book similar to the foregoing but listing vessels of all nations. Published by Lloyd's Underwriters of Great Britain.

Jane's Fighting Ships.—A book, published in England, giving data on the naval establishment (ship types, armament, pictures, navy yards, etc.) of every maritime nation in the world.

Fleet and Force Regulations.—Regulations issued by fleet and force commanders for the guidance of their commands.

TACTICAL TERMS

An elementary knowledge of the more important tactical terms used aboard ship and in the fleet is essential to the bluejacket.

The Navy afloat is shown as comprised of two main fleets. (Actually there may be ten or more fleets during a war.) A *fleet* is an organization of vessels and aircraft under the command of a commander in chief. It normally comprises all types of vessels and aircraft in sufficient numbers to carry on major operations in a given theater of war.

A major subdivision of a fleet is known as a *force.* Any force may be comprised of both vessels and aircraft of one or more types and from one or more fleets. A *task force* is a force that has been organized to accomplish a special task. The term force used in this sense should not be confused with the plural expression *forces afloat* as used to indicate the complete organization of the Navy afloat.

The fleet and force organization is prepared and issued by the Chief of Naval Operations. The basic unit of fleet vessels is the *division,* which is composed of two or more vessels of the same type. Two or more divisions of vessels comprise a *squadron.* Ordinarily, but not necessarily, a squadron is composed of vessels which are all of the same type. It should also be noted that, under special conditions, a squadron may be a separate organization whose commander operates directly under orders from the Navy Department. Two or more squadrons of submarines or light vessels, other than light cruisers, comprise a *flotilla.* A flotilla may also have assigned to it a flagship, tenders and aircraft. A subdivision of a fleet or a force into vessels of the same type is known as a *type organization.* Any type organization may have assigned to it a flagship, tenders and aircraft.

The basic unit of aircraft is the *section,* which normally comprises three aircraft. Two or more sections of aircraft of the same type make up a *division* of aircraft. One or more divisions of aircraft comprise a *squadron* of aircraft. Ordinarily, a squadron contains aircraft that are all of the same type. Two or more squadrons of aircraft comprise an *aircraft group* and two or more aircraft groups comprise an *aircraft wing.*

Vessels of the Transportation Services of the United States Navy are those included in the fleet train, in the Fleet Transportation Service and in the Naval Transportation Service. In time of peace, a fleet train comprises all store, repair, and hospital ships, all transports and other similar vessels that operate under a commander in chief. In time of war, vessels of these types that operate under a commander in chief form both the fleet train and the Fleet Transportation Service. Under such conditions, the fleet train comprises those vessels operating within the advanced area, and the Fleet Transportation Service comprises those vessels operating within the fleet transportation area. The Naval Transportation Service comprises all store, fuel, and hospital ships, all transports and similar vessels operating under the Director of Naval Transportation Service. The operation of this service in a theater of war is limited to the Naval transportation zone.

Vessels of the Transportation Services will be governed by the laws of the United States, by United States Navy Regulations, and by special instructions issued by the Navy Department or by the Commander in Chief under authority of the Navy Department.

METHODS OF VISUAL SIGNALING

Visual communication between ships or between ships and shore stations is accomplished primarily by means of (1) *flashing light,* (2) *semaphore,* and (3) *flag-hoist.* Flag-hoist is the most rapid and accurate method when ships are within visible range during daytime, and is an efficient means of conveying tactical signals, but the text which may be transmitted is limited directly to the signals and their meanings, which are contained in the signal books employed. Semaphore is much more rapid than flashing light for daylight transmission, but it is effective at comparatively short ranges only (which provides considerable security from enemy interception). Visual signaling by flashing light is highly effective at night and moderately effective in the daylight. Its use in wartime is somewhat restricted for security reasons, although it is widely employed for recognition purposes. Both semaphores and flashing light are slower than flaghoist signaling, but are more flexible in the matter of the text which may be transmitted.

In addition to the above primary means of communication, the following secondary systems are employed: (1) *sound*, and (2) *pyrotechnics*. Sound signaling is prescribed for use in thick weather and under circumstances where the use of radio is inadvisable, and when such signals will not be confusing, either to strangers or to our own ships, in connection with the Rules of the Road, or emergency signals. Sound may be made on the whistle, foghorn, or similar sound-producing apparatus. The International Morse alphabet and special signs are used. A short blast of the whistle or single stroke of a bell represents a "dot"; a longer blast, or two strokes in quick succession, represents a "dash."

THE INTERNATIONAL MORSE CODE

The International Morse code is the Navy dot-dash system. Each letter and number is represented in the Morse code by a particular arrangement of dots and dashes. As the possible arrangements of dots and dashes are not limited to 36—which is the total of letters and numbers—other combinations have been developed and are used in naval communications. Of this nature are the prosines (procedure signs) and prosigs (procedure signals) of radio; and the procedure signals of visual signaling.

The Morse code is particularly adapted to sound signaling, where the source of the sound can be made to emit sound signals of any desired duration. For this reason the Morse code is used in radio, sound and whistle signaling. It is also adapted to visual signaling and is used with flashing light and ardois (colored lights). The flashing light use of the Morse code is most important in the Navy.

A ·—
B —···
C —·—·
D —··
E ·
F ··—·
G ——·
H ····
I ··
J ·———
K —·—
L ·—··
M ——
N —·
O ———
P ·——·
Q ——·—
R ·—·
S ···
T —
U ··—
V ···—
W ·——
X —··—
Y —·——
Z ——··
1 ·————
2 ··———
3 ···——
4 ····—
5 ·····
6 —····
7 ——···
8 ———··
9 ————·
0 —————

BLINKER TUBES

The blinker tube provides a system for signaling that is directive and of limited range when ships are darkened. The blinker tube is essentially a light encased in a tube, which is closed at one end, and whose light may be turned off and on by means of a trigger-operated switch. In signaling at night, there is a tendency to use a more powerful system than is necessary. In general, the lowest range system that will answer the purpose should be used.

TRANSMITTING AND RECEIVING BY FLASHING LIGHT

The characters are made by alternately exposing and obscuring the light. A short flash is represented on paper by a dot and a long flash by a dash according to the following ratio:

A dot is taken as a unit.

A dash is equivalent to three units.

A pause between two elements of a letter is equal to one unit.

The character of a letter or numeral is composed of all of the above elements and the pauses between the elements that go to make up the flashing light equivalent to that letter or numeral.

Each character should be sent in a quick and snappy way. The time length of the character should never be more than it would be if the rate of sending were 16 words a minute. Slower rates of sending should be secured not by dragging out the characters but by leaving longer pauses between them.

In reading you must train yourself so that you will instantly

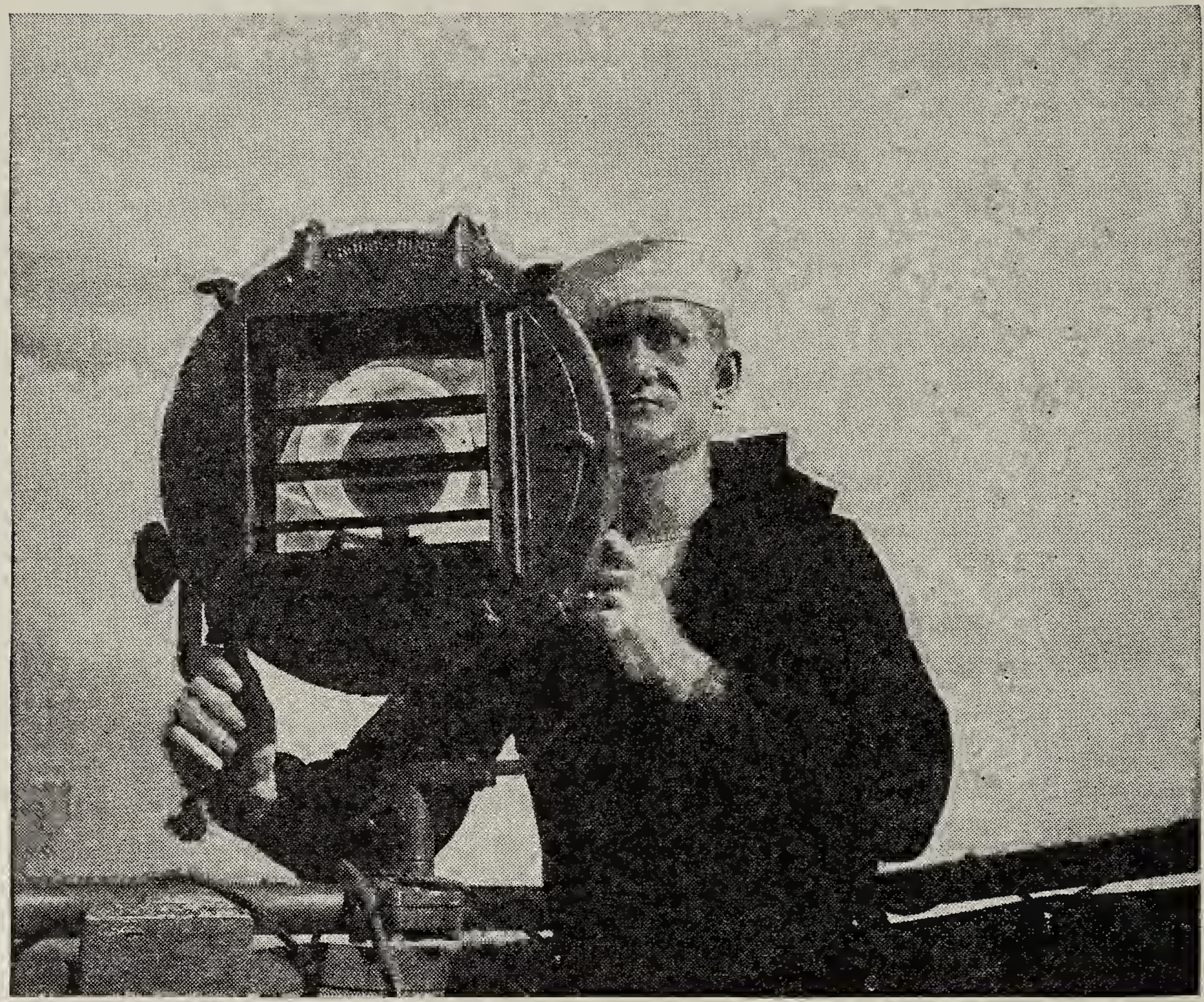


FIGURE 43-1.—Transmitting by searchlight.

recognize a certain display as the equivalent of a certain letter. Since you are learning to send so that the length of your dot and the length of your dash and the pause between 2 elements of a letter are the same as when sending at the rate of 16 words a minute, it follows that in receiving you must train yourself to recognize letters when they are sent at the same speed. To do this you must learn to recognize each letter by the whole display that represents it. It may take you some time to do this, but one day you will suddenly find that you have it. You must remember that you have to work to get it. It will not come without hard work. Do not get into the bad habit of trying to learn a letter by breaking it up into its elements. If you do this you will find later on that by the time you have broken up Q into dash dash dot dash, then searched your mind for the letter whose equivalent is dash dash dot dash, and finally decided that it is Q, the next 2 or 3 letters will have been sent and you will have missed them. Without having to analyze the display itself, you must learn that a certain display made up of short and long flashes means a certain letter.

FLASHING LIGHT SYSTEM

The requirement for flashing light signaling is that the light can be flashed and eclipsed at will by a quick-working mechanism. Two methods are used. The shutter, in which the light remains on and is eclipsed by the shutter to make dots and dashes; and the make/break electric circuit, in which the light is turned on and off by closing and opening the circuit with a telegraph key.

The shutter method is used with signal searchlights. The make/break method is used with the many electric light systems. Examples are the yardarm blinker, the blinker tube, and the hand flashlight (battery). Generally speaking, any electric circuit equipped with a lamp and a switch can be used for sending flashing light signals.

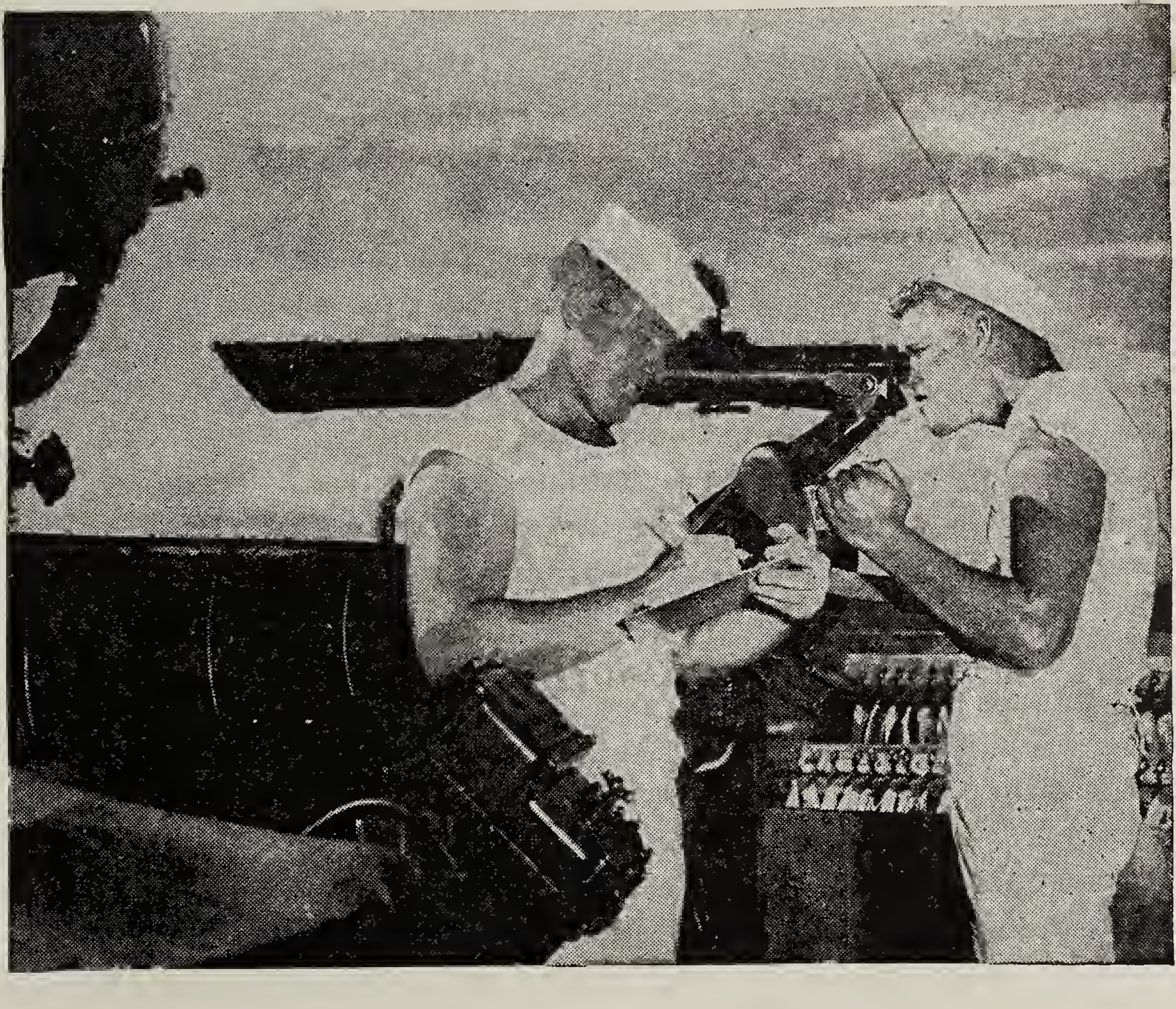


FIGURE 43-2.—Receiving a searchlight message from a distant ship by telescope.

YARDARM BLINKER

The yardarm blinker is a special electric lamp, properly protected from the weather, which is located near the end of the yardarm. It is operated from a key on the signal bridge or other signal station. The blinker sets on the fore and main yards may be used independently, or together.

SEARCHLIGHTS

Searchlights are classified according to their size, power, and type of light. The source of light in the low- and high-powered searchlights is a carbon arc. The flashes from it are controlled mechanically by opening or closing a venetian blind shutter. The flashes of the incandescent lamp searchlight, which is used for short-distance signaling, are controlled by a telegraph key located on the signal bridge, similar to the yardarm blinker. A large searchlight is the longest range daylight system of visual communication used in our Navy. At night the searchlights and yardarm blinker systems are practical for rapid dissemination of signals to a large number of vessels, and also insure the uniform execution of signals.

SEMAPHORE

Semaphore is the signal system currently in use which is based on the changing angle alphabet. The angles are formed by changing the positions of the outstretched arms (and the angle between them) to form the angles representing the letters of the alphabet. Numerals are always spelled out in semaphore.

Semaphore is a daytime signaling system. It was formerly used at night with a machine having movable illuminated arms, but this device was considered to be superfluous compared to the efficiency of the flashing light. Semaphore is more efficient than the wig wag, which is the daytime Morse code flag system.

Although the angles are formed by the positions of the arms, and the arms alone can be used for short distance signaling, the approved and required procedure is to hold semaphore flags in the hands. The flags increase the range of transmission.

Semaphore is used at sea for P.D.L. (pass down the line) work between ships in formation. In port it is used for all daytime administrative signaling between ships which are within semaphore signaling distance of each other.

In sending, each letter should be made clearly, the arms should be fully extended, and a distinct pause should be made at each exact position. Changes from one position to the next should be made by the shortest route, and only one arm should be shifted in cases where it is not necessary to move both. In figure 43-4 the uses of *Answering* and *Attention* need no explanation—*Front* is used to indicate a pause, as between words.

$\overline{\mathrm{BT}}$ indicates that the text of the message is to follow. $\overline{\mathrm{AR}}$ indicates the end of the message.

To call a ship by semaphore, first select a good background, then face the ship to which the message is to be sent, and make the attention sign several times or slowly spell her name or her visual call, if known, repeating until she makes the answering sign. In all messages that a bluejacket, other than a signalman or quartermaster, is apt to send, it will be sufficient (after being answered) to make $\overline{\mathrm{BT}}$ and then transmit the message, making $\overline{\mathrm{AR}}$ at the end. Thus a sample message from a petty officer in charge of a working party on a beach would be: "$\overline{\mathrm{BT}}$ Duty completed please send boat for working party $\overline{\mathrm{AR}}$."

PROCEDURE SIGNS

Procedure signs ordinarily used are given below. Letters overscored are made as one word:

Error	EEEEEEEE
Repeat	$\overline{\mathrm{IMI}}$
Long Break	$\overline{\mathrm{BT}}$
Group Sign	GR*
End of word	Front
End of transmission	$\overline{\mathrm{AR}}$
Repeat all before word	$\overline{\mathrm{IMI}}$ AB word
Repeat all after	$\overline{\mathrm{IMI}}$ AA word
Repeat word after word	$\overline{\mathrm{IMI}}$ WA word
Received	R†
Move to your right	MR
Move to your left	ML
Move up	MU
Move down	MD

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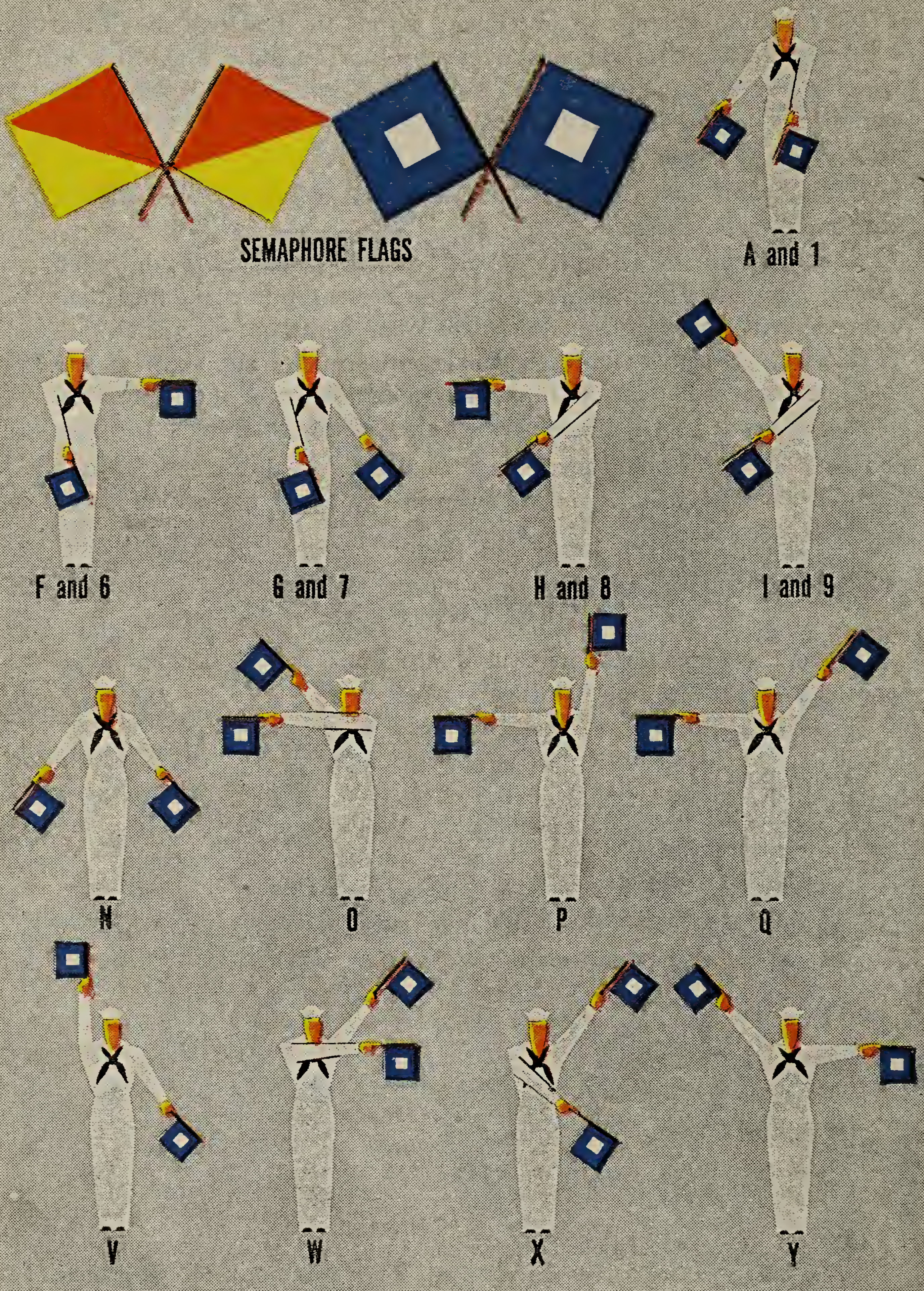
* Followed by number spelled out.

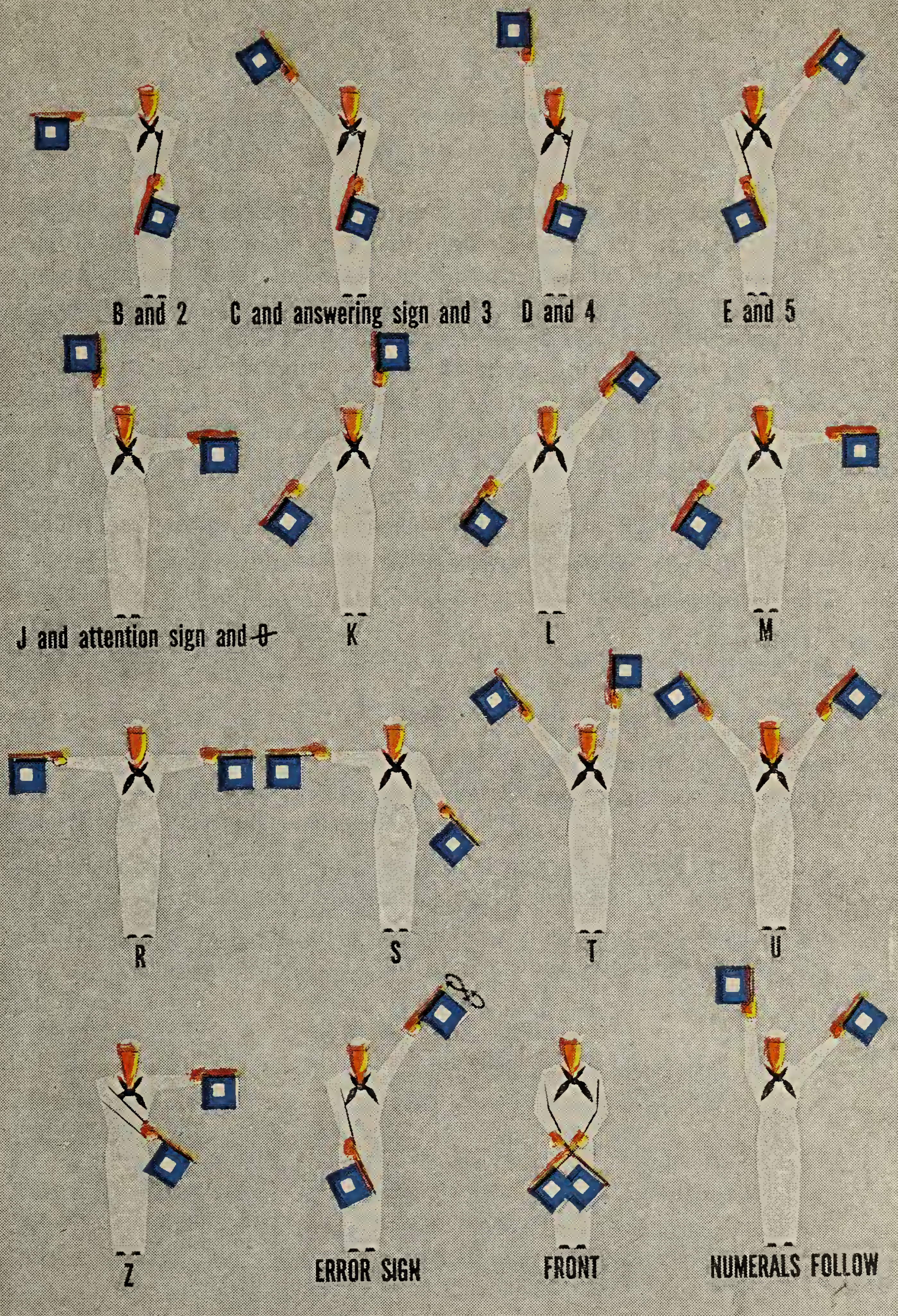
† Used only when call flags are not used. When flags are used, the hauling down of the call signifies "dispatch received."

THE SEMAPHORE ALPHABET



SEMAPHORE FLAGS
A and 1
F and 6
G and 7
H and 8
I and 9
N
O
P
Q
V
W
X
Y

FIGURE 43-3



B and 2 C and answering sign and 3 D and 4 E and 5

J and attention sign and ~~0~~ K L M

R S T U

Z ERROR SIGN FRONT NUMERALS FOLLOW

Figure 43-4

CALLS

1. To call a ship's commander or unit, flag hoists are used. Each commander or unit is assigned a call, which is made by means of the flags.

2. To call without the use of flag hoists, face the ship or station called and make the attention sign. If this is not sufficiently definite, three or four letters abbreviating the name of the ship or station will be used as a call. To answer a call, make the answering sign.

3. As an example, for use in signal drill, John Doe of the *Wisconsin* wishes to send the following message to James Pederson on the *Oriskany*. "Come over to smoker tonight."

4. The signalman faces the *Oriskany* and makes *Attention* sign. *Oriskany* fails to get the call, so he sends the abbreviation "Oris" until the call is answered by the *Answering* sign.

5. As soon as *Wisconsin's* call is answered as above, the procedure for sending and receiving the signal is as follows:

Wisconsin (sending)	*Oriskany (receiving)*
Makes *Front*	Do.
Makes GR5 $\overline{\text{BT}}$ MSG	Do.
Makes *Front*	Do.
Sends the 5GR message	Do.
Makes *Front* after each group	Do.
Makes $\overline{\text{AR}}$ at end of message	Makes R to show that message is received and understood.

6. Letters MSG in the text indicate that the dispatch is unofficial.

7. In case the message is not understood, the man receiving can ask to have any part of it repeated by using the repeat signal $\overline{\text{IMI}}$ followed by the letter indicated in the "Procedure Table."

CHAPTER 44

Flags, Pennants and Flag Hoist Signaling

For signaling by flag hoist, the United States Navy uses the International alphabet flags and numeral pennants, and in addition, a set of numeral flags, and special meaning flags. Each flag and pennant used has a name, each alphabet flag having the name of the letter which it represents. The numeral flags and pennants take the name of the numeral they represent. These names and the meanings of the various flags and pennants will be taken up in the first half of this chapter, followed by an outline of signaling methods and procedures.

Flag hoist signaling provides a rapid and accurate system of handling tactical and informational signals of reasonable length during daylight. In general, a flag hoist signal insures a more uniform execution of a maneuver than does any other system. Flag signals are rapidly disseminated to a large number of vessals in close contact.

PARTS OF A FLAG

Figure 44-1 shows the various flag types and their parts.

The *fly* is the length of the flag measured from the staff to the farthest or outside edge.

The *hoist* is the vertical depth of the flag when flying free.

The *tabling* is the double thickness of bunting, taped, bound, and stitched, which is at the hoist of a flag.

The *tail line* is a short length of halyard attached to the lower part of the tabling and carrying the snap hook. It serves as a spacer, separating the flags of a hoist for clearness in reading signals. (The tail line is illustrated in Figure 44-5.

The *ring* is attached to the top of the tabling and snaps into the tail line of the preceding flag, tack line or hook of the halyard. This is illustrated in figure 44-5.

The *tack line,* illustrated in figure 44-1, is a 6-foot length of braided signal halyard having a ring at one end and a snap hook at the other. Note the manner in which the ring and snap hook are spliced to the halyard. All such work on flags and halyards should be equally as neat, and is one of the indications of a smart signal force.

FLAG TYPES AND PARTS

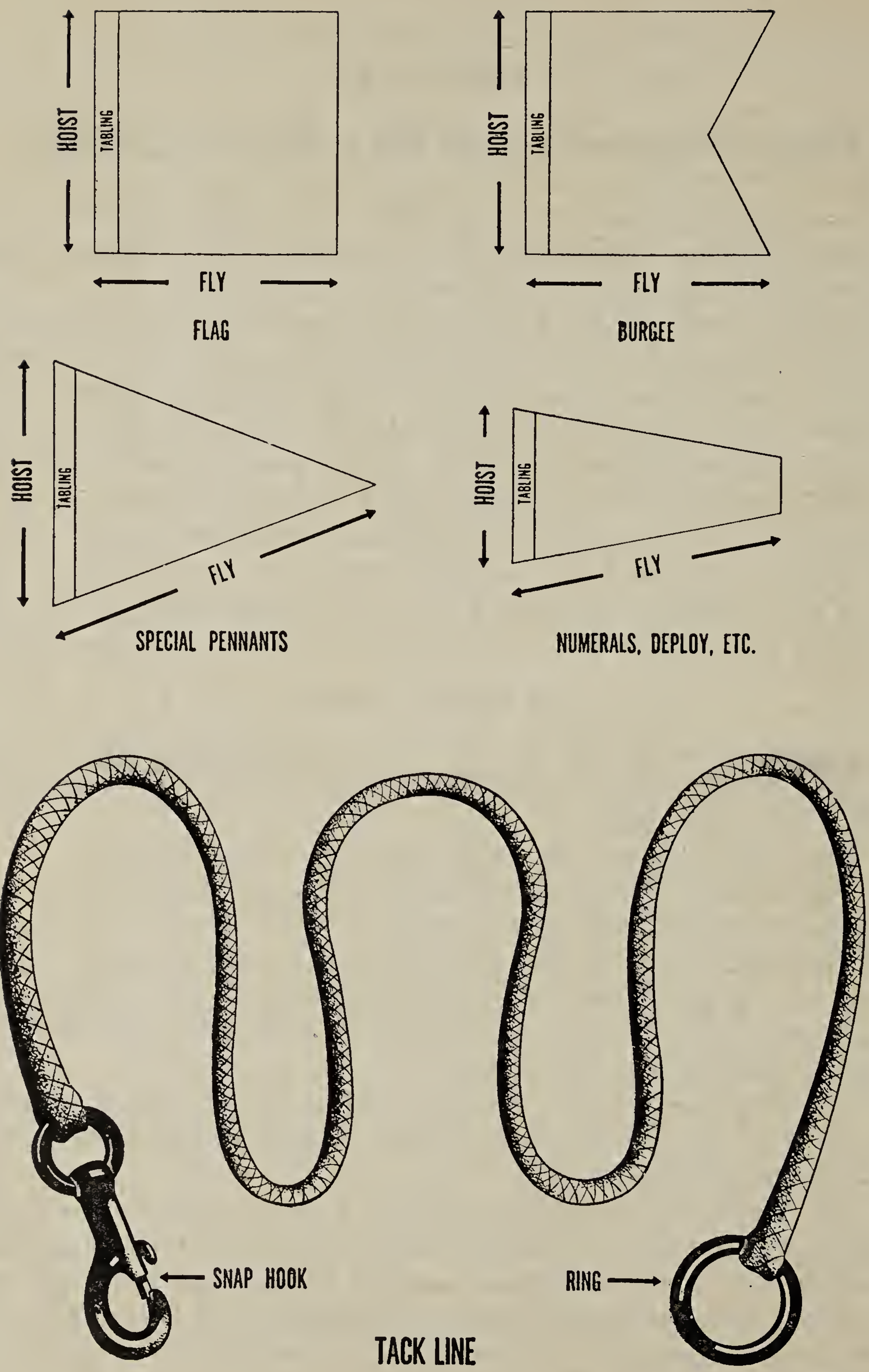


Figure 44-1

INTERNATIONAL ALPHABET FLAGS

The alphabet flags shown in figures 44-2 and 44-3 are called alphabet flags because the first letters of their names form the complete alphabet. Whenever changes in the naming of the flags—as an international signaling system—are decided upon, the new names also start with the appropriate letter. The Navy has special names for some of these flags because they have particular uses in Navy signaling. These flags are called the governing flags and may be remembered by referring to the word PIANO as indicated below:

P	Prep
I	Int (Interrogatory)
A	Afirm
N	Negat
O	Option

These purely Naval names of the above flags are additional to the international names. Any signal may be modified or governed by hoisting one of these five flags. All are spoken as printed above except Int, which is called *Interrogatory* when spoken.

The alphabet flags are rarely, if ever, used to spell out words. Various arrangements of the flags in a single hoist are used to convey special meanings according to an international signal code. This code is used for communications between ships of different nations when communicating on the high seas. A copy of this code book is always kept on the bridge. Similar arrangements of these flags, not found in the *International Code of Signals,* are used to convey purely Naval communications between Naval vessels. The names and appearance of the alphabet flags (figures 44-2 and 44-3) should be learned by every bluejacket.

LEARNING THE ALPHABET FLAGS

To assist you in learning the flag alphabet, practice sketching each flag, indicating its proper color or colors.

When you feel that you know every flag of the alphabet, get one of the rated signalmen to test you on the alphabet flags. Ask him to call out at random the various letters of the alphabet and have you name and describe the corresponding flags. Whenever you are topside, pay particular attention to the flag hoists which are flying from the various ships close aboard your own, and check yourself on your

FLAG AND INTERNATIONAL CODE ALPHABET

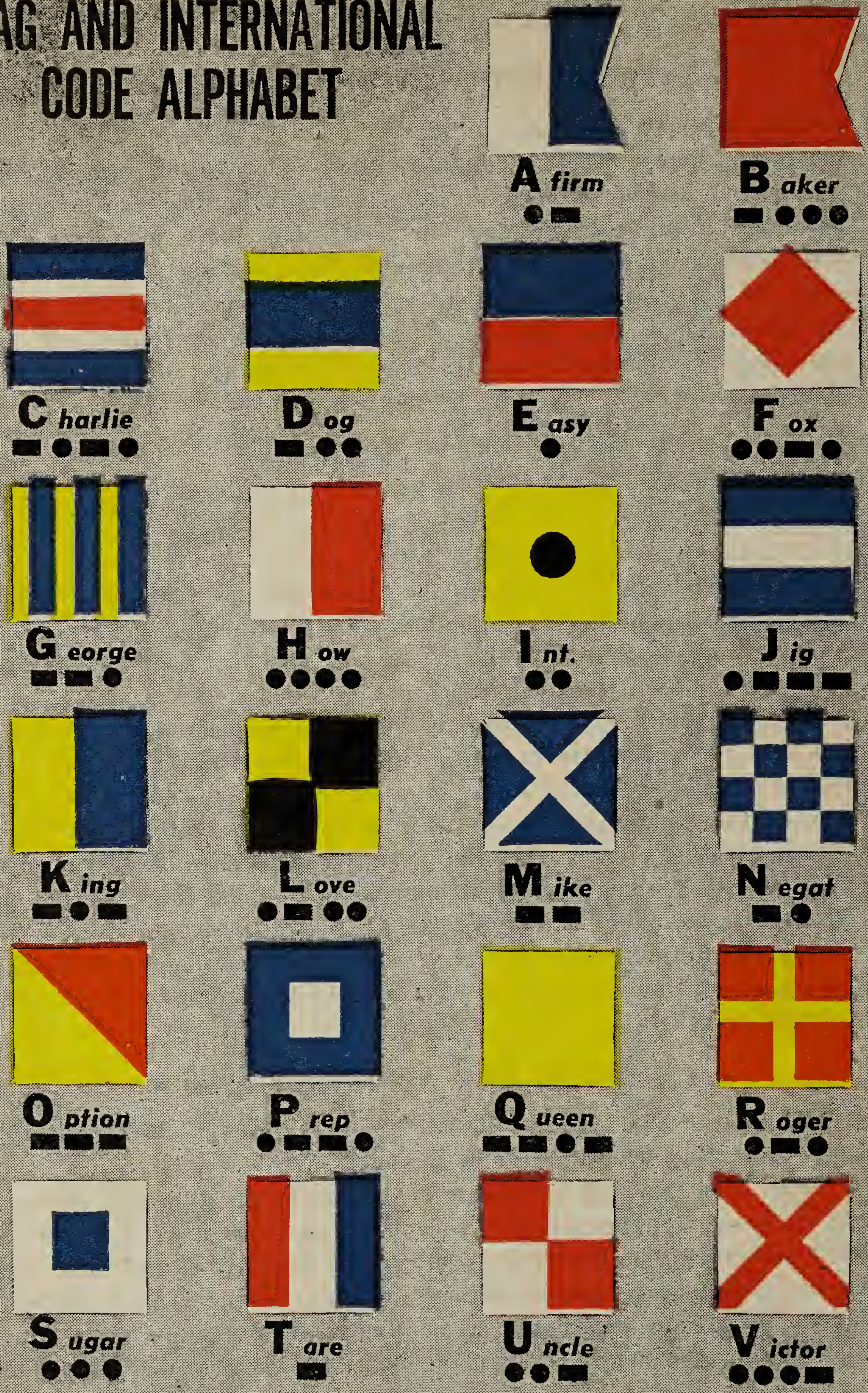
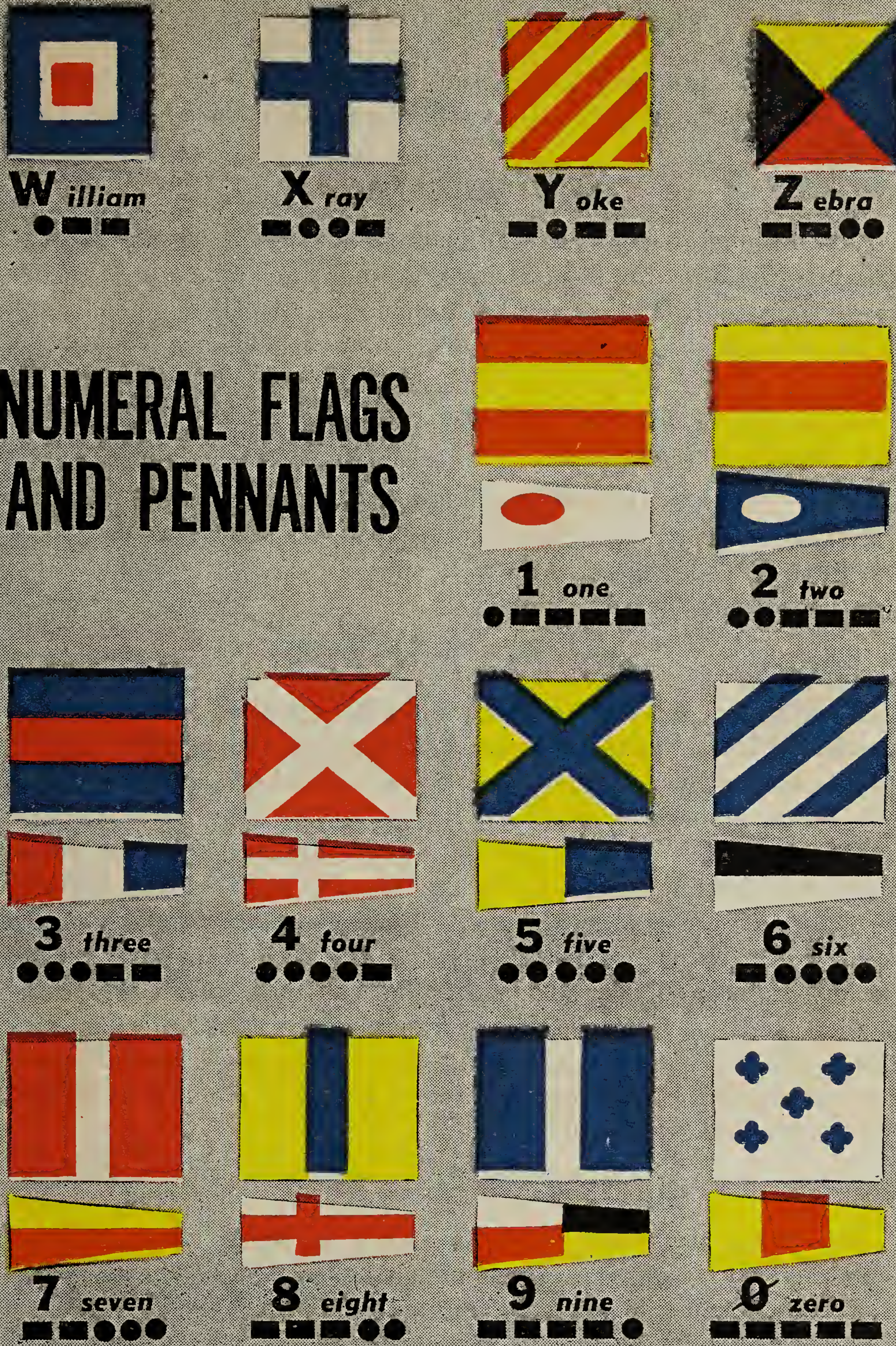


FIGURE 44-2



W illiam
• ▬ ▬
X ray
▬ • • ▬
Y oke
▬ • ▬ ▬
Z ebra
▬ ▬ • •
NUMERAL FLAGS AND PENNANTS
1 one
• ▬ ▬ ▬ ▬
2 two
• • ▬ ▬ ▬
3 three
• • • ▬ ▬
4 four
• • • • ▬
5 five
• • • • •
6 six
▬ • • • •
7 seven
▬ ▬ • • •
8 eight
▬ ▬ ▬ • •
9 nine
▬ ▬ ▬ ▬ •
0 zero
▬ ▬ ▬ ▬ ▬

FIGURE 44-3

ability to recognize and name them. The above study coupled with your daily flag hoist drill will enable you to learn the alphabet flags quickly.

NUMERAL FLAGS

The 10 numeral flags are used in their numeral sense, in flag signals, with the alphabet flags and special pennants. When used in the text of signals by Morse method, numerals are spelled out and are so recorded. Each is spoken by name. Numeral flags are not used in calls.

The first four numeral flags are used to direct ship's boats and have the following meanings:

1 Flag—Steer to right of line looking from ship to boat.
2 Flag—Steer to left of line looking from ship to boat.
3 Flag—Steer straight away from ship.
4 Flag—Steer towards ship.

NUMERAL PENNANTS

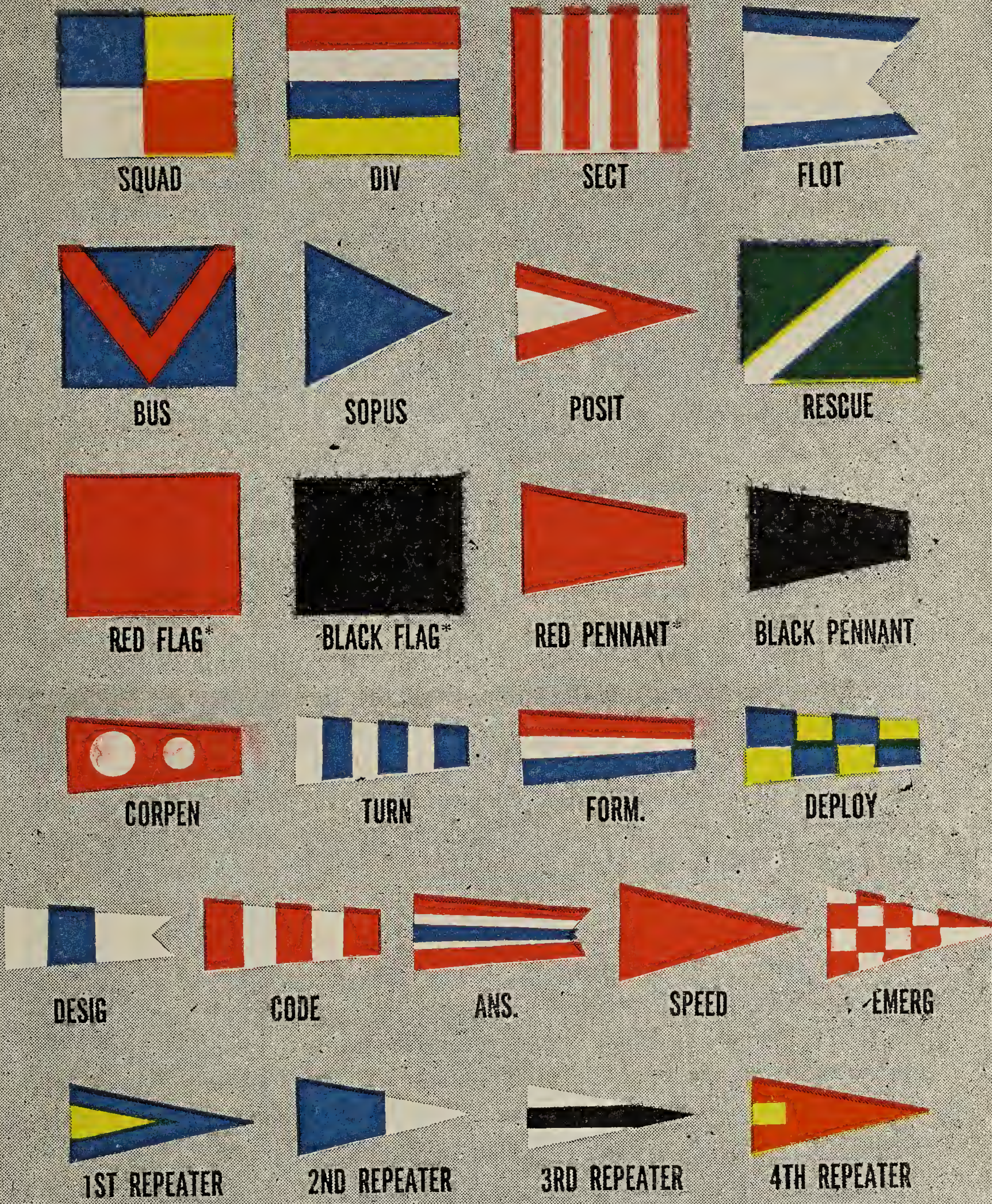
Numeral pennants are used only in calls. When used in the text of signals by Morse method, each is spelled out and is so recorded. Each is spoken by its name. Their Morse equivalents are the same as those of the numeral flags.

Certain collective calls consist of a single numeral pennant. There is, however, nothing particular in the meaning of the call to indicate the choice of the pennant used. As examples, 3 pennant currently calls "this division" and 4 pennant calls "this squadron." Single pennant calls facilitate and simplify the call up between unit commanders and the vessels of their units, and are used for visual signaling only. They are never transmitted by radio. These special single pennant collective calls may be found in the current issue of the *U. S. Navy Call Sign Book.*

SPECIAL FLAGS AND PENNANTS

The special flags and pennants shown in figure 44-4 are particular to Navy signaling except the first, second and third repeats and the code pennant, which are international. *Bus* is the U. S.-British flag. The red and black flags and the red pennant are not authorized for U. S. Naval use. All the special flags and pennants are called by the names given in the illustration, except Form and Ans, which are spoken *Formation* and *Answering* respectively.

SPECIAL FLAGS AND PENNANTS



TACK LINE · *A piece of line 6 feet long, fitted with a snap and a ring.*

* Not accepted for U. S. Navy use.

Figure 44-4

REPEATERS

Whenever possible, repeaters shall be used rather than using any alphabet flag, numeral flag or numeral pennant more than once in the same hoist. Repeaters, except when used with their special meanings in connection with relays, are not special pennants, and therefore they are never used as substitutes for the special flags, special pennants (including repeaters used with their special meanings), or the tack line. When counting up from the repeater, to determine which flag or pennant it represents, the special flags, special pennants (including repeaters used with their special meanings), and the tack line are not included in the count.

UNIT INDICATOR FLAGS

Unless otherwise specified in the signal meaning, a unit indicator flag has the following meaning:

1. As the first flag of a signal, it means that the purport of the signal will be carried out by each section, division or squadron individually; that is, in the same manner as if the signal proper without the unit indicator flag had been addressed to each section, division or squadron.
2. As the last flag of a signal, it means that the unit indicated is the unit for carrying out the purport of the signal.
3. The call sign for any regularly organized and numbered section, division or squadron of ships is made up of the class letter with SECT, DIV, or SQUAD, and the numeral (s) assigned to the unit called. The class letter may be omitted in flag hoists whenever no confusion is likely to result.

PENNANTS

The meanings of the pennants when used in connection with or as a part of a signal (flag hoist) are given in the General Signal Book. Each and every flag hoist signal received should be looked up in the appropriate signal book before its meaning is announced. A signalman should NEVER announce the meaning of a flag hoist signal from memory.

HOW TO MAKE UP A FLAG FOR BREAKING

First get out a flag, and about one fathom of white twine. In following this description of how to make up a flag for breaking, refer

HOW TO MAKE UP A FLAG FOR BREAKING

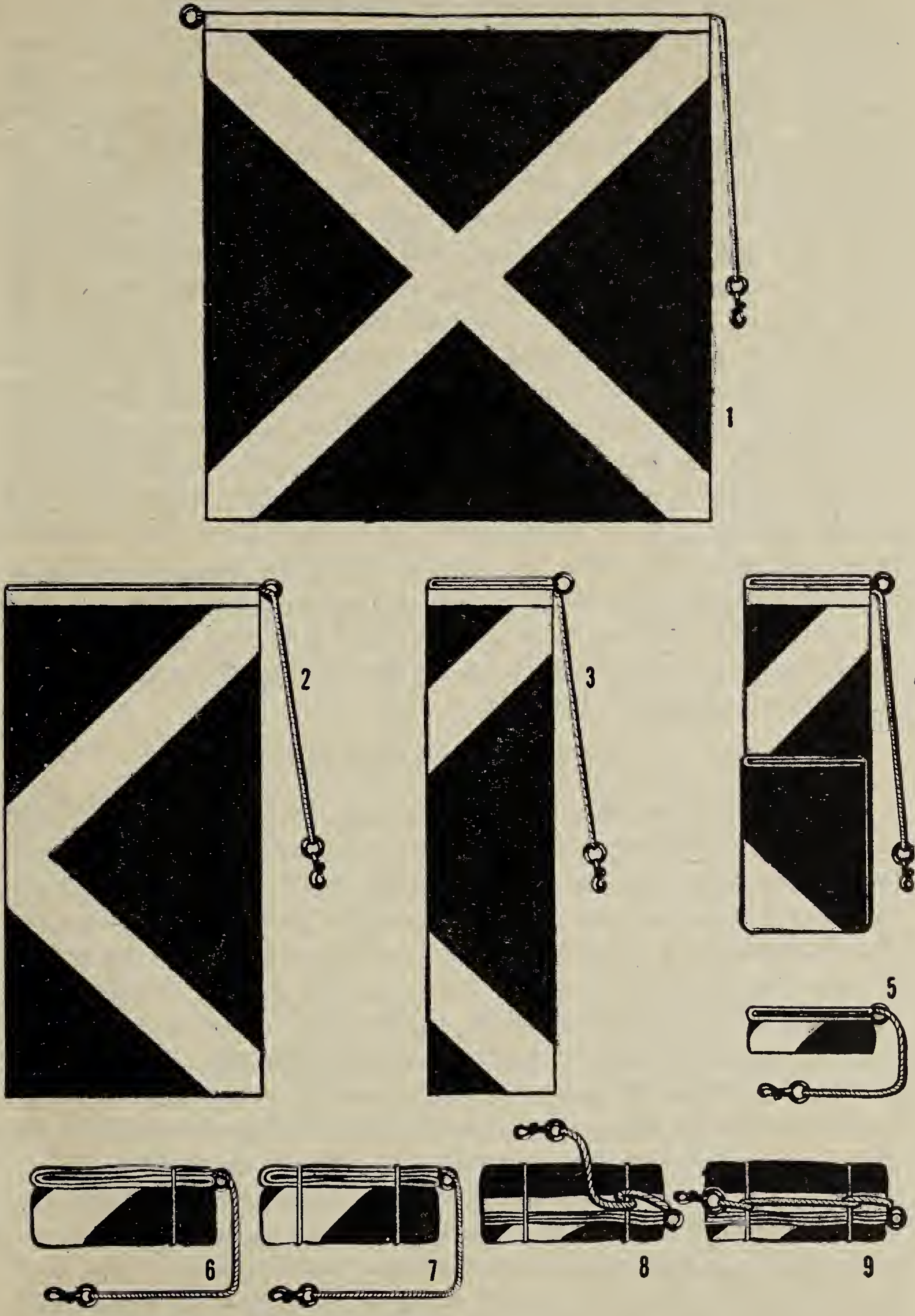


Figure 44-5

to figure 44-5, which illustrates the various steps outlined below.

Lay the flag out on deck with the hoist end away from you and with the ring on your left and the snaps on your right (1); now fold the flag to the right, so that the left half just covers the right half (2); then fold it again the same way from left to right (3); now take the fly end and fold it up so that the end will be about three-quarters of the way to the hoist of the flag (4); then roll it towards the hoist end into as small a roll as possible (5); now take the white twine, and run it twice around the roll about 2 inches from the ring and tie it (6); do the same to the other end of the roll (7); now take the tail line and with it take a full hitch around the white twine near the ring end (8); now with the remainder of the tail line take another hitch around the twine at the other end of the roll (9). The flag is now ready for breaking. In the last two steps, make sure that the tail line lies on the outside next to the tabling, so that when a strain is put on the tail line, it will break free and away from the ring and hence will not foul. Clear the halyard, bend the flag on, run it up smartly, making sure to keep it clear of the mast. All that is now necessary to break the flag from the masthead is to give a sharp downward thrust on the halyard. If the flag has been made up as described it will break open and fly freely.

HINTS ON SIGNALING

Communication security.—Each man must do his part to help maintain communication security. The information received through bridge dispatches (official and unofficial) which pass through a signalman's hands, and the knowledge of the contents of the various signal publications, must be regarded as having a security status, and must not be discussed with, or in the presence of, or disclosed to, other than the proper authorities. All communication personnel occupy a unique position of trust, in this respect, and it should be a matter of pride never to discuss or give out any advance information concerning either the contents of messages sent or received, or the gist of any official conversations which might be overheard.

Procedure.—The various rules and regulations governing procedure for the transmission of dispatches and signals have been so framed as to insure the maximum accuracy and rapidity of transmission. There is a good reason for every detail described. Suggestions, which would tend to increase the efficiency of the communication service, are always welcome, but remember that prescribed forms cannot be changed without the sanction of proper authority.

Accuracy.—Accuracy is essential in all communication work. Smartness is necessary and desirable, but not at the expense of accuracy.

Dispatches which are to be sent by semaphore or Morse should be concise and clear, and so worded as to avoid ambiguity without punctuation. Dispatches, so worded, are less liable to error. Remember, however, that the wording can be changed only by the originator of the message. When repetitions are asked for, it is more often the fault of the sender than of the receiver. Remember, there is no substitute for accuracy.

Recording.—All dispatches should be recorded in clear, legible writing. Clear writing is essential to accuracy. However, when recording code or cipher, all letters should be printed distinctly. Remember that even one incorrect character will cause a garble, and an unnecessary amount of extra work for the officer who decodes the dispatch.

The date, time of transmission or receipt, number or time group, method of transmission, whether sent or received, transmitting ship, the receiving ship or ships, and if relayed "from" and "to," should be carefully and immediately recorded.

All incoming dispatches should be initialed by the receiving signalman and by the officer (or other person) in charge of the bridge at the time of the receipt. In the case of copies, either action or information, the original should show the distribution, and also bear a receipt in the form of initials of the addressee(s). To guess at a character or a word when receiving, in the hope that the contents of the dispatch will prove the "guess" correct is inexcusable and is not tolerated. If a character has been missed, the signalman should not be influenced by false pride, but should ask for a repeat immediately. Remember that nothing should be taken for granted, and nothing considered as seen until it has been positively and clearly in view. Watch the transmitting station until the last character has been made and be very careful that the "end of transmission sign" has been made before taking your eye off the transmitting signalman.

Original copies of outgoing dispatches should bear the initials of the signalman in charge of the watch and the initials of the signalman sending the dispatch. After being transmitted the copy should be returned to the communication office with a notation showing the time and method of transmission.

Flag hoist traffic.—Flag signals, as a rule, convey orders which call for immediate action. Every endeavor should be made to read, reply to, understand, and to two-block such signals without delay. When not actually engaged, signalmen should stand clear of those engaged, and be on the alert. When making hoists, see that the flags are properly snapped together and that each is clear as it runs out. When flags are foul, or when there is little wind, do not work the halyards "up or down," as to do so may cause another ship to report "Signal down," thereby causing confusion. The "hoist" halyard should be kept taut and the flags waved back and forth or the "down haul" halyard jerked. Smartness in signaling with flag hoist depends upon the manner in which the following are observed:

1. Accuracy in bending on the correct flag the first time
2. Rapidity in getting up the hoist
3. Smoothness in hoisting and quickness in catching a turn with the halyard, and then hauling the down haul halyard taut, so as to make a straight standing hoist
4. Sending up all flags clear
5. Visibility of the signal as it goes up, which means keeping a fairly taut down haul halyard while hoisting
6. Smartness in getting the signals down sharply and smoothly, without allowing them to stream off to leeward, over the side, etc.

Signal watch.—When coming on duty, a signalman should read over the file of the past watch for information of dispatches and signals sent or received, make a rapid check of the equipment entrusted to his care (such as signal glasses, spy glasses, books, searchlights, condition of flag bags), and should ascertain from the man going off watch the details of any *unfinished* business. Dispatches are to be followed up until they are *finished* business. Particular attention should be paid to see that there are no *Irish pennants* anywhere about the bridge.

Signalmen should not congregate on any part of the signal bridge. Silence is characteristic of a properly organized signal force, and noise is a sign of inefficiency. The attention of the signal force should be fixed on the one in charge of the bridge as much as possible. Should more than one hoist be displayed, it is important in giving an order to "hoist" or "haul down" to state or designate the halyard to be used. Failure to do this may result in confusion.

Care of material.—Flag bags should be kept neatly stowed with all flags clear for running at all times. In inclement weather, flag bag covers should be kept on, except when actually engaged in signaling. Dirty or torn flags make the reading of signals more difficult and reflect discredit on the ship using them. Torn or frayed flags should be set aside and repaired at the first opportunity.

Telescopes and binoculars should always be kept in good condition. In wet weather, all glasses should be kept under cover, except when in actual use. When a glass becomes wet, it is very important to wipe the sliding tube dry; otherwise moisture will stay on the inside of the glass for some time. At sunset and at daybreak all night signal equipment should be checked to ascertain if it is in working order.

All halyards should be kept clear and taut, by day, in fair weather. In fog or wet weather they should be eased off to prevent unnecessary strain due to shrinkage. When it is too dark to signal by flags the halyards should be eased off. Halyards should be single, and hoisted hand over hand. No device to increase the speed of hoisting them, such as Spanish burtons, deck blocks, etc., is permitted.

Anything which has been lost, or any piece of apparatus damaged or out of order, should be reported at once to the chief signalman (or signalman in charge of the watch), who should report it at once to the Officer of the Deck.

Men aloft.—Whenever it becomes necessary to send a man aloft to clear halyards, bunting, or for any reason, permission should first be obtained from the Officer of the Deck in order that the radio room may be notified, and arrangements made so that no radio transmission occurs while the man is aloft. Make certain that the man does not go aloft until word has been received that the power has been turned off. To do otherwise is to assume an unwarranted and unnecessary risk.

DRESSING AND FULL DRESSING SHIPS

Dressing ship.—Ships of the Navy are dressed or full dressed on special occasions, such as certain national holidays, or as a compliment to a foreign nation or distinguished personage. Such occasions would be the Fourth of July, Washington's Birthday, Navy Day, and foreign national holidays when in foreign waters.

National ensigns shall be hoisted at each masthead when dressing ship except in the case of a flagship. If the dressing is complimentary to some other nation, then the ensign or standard of that nation shall be hoisted at the main, and, except on a flagship, the United States ensign shall be hoisted at the fore. On a flagship when dressing ship, either on an occasion of our own or complimentary to a foreign nation, any personal flag flying at the main shall be shifted to the fore.

Special flags such as guard flags or the battle efficiency pennant shall be dipped clear of an ensign or personal flag flown at the fore.

On the occasion of dressing ship, all derricks, booms, etc., shall be placed in the position in which they secure; the flag and jack staff shall be shipped. If the masts are of the same height, the national ensigns shall be of the same size. The largest ensign furnished the ship shall be hoisted at the staff aft or at the peak. The jack shall be hoisted forward at the jack staff. The ship shall be dressed at 8 A.M. and remain dressed until sundown.

Full dressing ship.—On the occasion of full dressing ship, in addition to the dressing of the mastheads, prescribed for dressing ship, when the masting of a ship will permit, a rainbow of flags shall be arranged reaching from the water line forward to the water line aft by way of the head booms, topgallant masthead, peak, spanker boom. In ships having no boom or spanker, the line shall be brought to the jack staff forward at the height of the ridge rope, and to the flagstaff aft to the height of the ridge rope. In ships with cage masts the line shall be brought to the platform at the top. Peculiarly masted vessels shall provide to make the most artistic display, as little modified from the rainbow effect as it is possible for them to arrange.

Flags shall be stopped on the line at a uniform distance of 12 inches apart. Attention is invited to the fact that the water line forward (or jack staff at ridge rope) is the starting or reference point, the sequence of flags from the water line to the water line. Where more than one set of flags is required, repeat the sequence, commencing with 3 flag, 4 flag, etc.

CHAPTER 45

Pyrotechnics, Distress Signals and Storm Warnings

Since ship pyrotechnic material may be used for signaling during operations, every signalman should have knowledge of the various types in use, their proper care and handling. When used for signaling to or from boats, the signal significance of the various colors and displays will each time be explained in the operation orders given to the boat. These meanings are not necessarily permanently established.

SAFETY PRECAUTIONS AND STORAGE

The following paragraphs apply to ship's pyrotechnics as distinguished from aircraft pyrotechnics.

Safety precautions.—Pyrotechnic ammunition is more subject to deterioration than some other types of ammunition; therefore, it shall be kept from direct rays of the sun, high temperatures, absorption of moisture, corrosion, rough handling, and from movement in storage on board ship.

When actually using pyrotechnic ammunition, the minimum amount required should be opened, and personnel in the vicinity of the firing should be kept to a minimum, and at a reasonably safe distance.

Pyrotechnic ammunition is, in general, a fire hazard and forms a very hot fire, difficult to extinguish. Almost all types furnish their own oxygen upon combustion, but large volumes of water may serve to cool the materials, or at least adjacent materials, below the ignition temperature.

Pyrotechnic ammunition found in a deteriorated, damp or damaged condition should be reported at once to the signal officer, who in turn will make the necessary report to the gunnery officer of the ship.

Storage instructions.—1. Pyrotechnics and pyrotechnic ammunition (except illuminating projectiles) shall be stored in cool, dry magazines below decks, preferably above the water line, or in special pyrotechnic lockers located on the weather decks of surface vessels.

Submarines shall stow pyrotechnics and pyrotechnic ammunition in approved designated places.

2. If the quantity of any type of pyrotechnic ammunition be large, it shall be stored separately from other types of pyrotechnics.

3. That part of signaling pyrotechnics for boats shall be packed in water-tight boxes and may be stowed in boats as required by existing instructions.

4. Certain materials classed as pyrotechnics, such as illuminating elements of illuminating projectiles, and tracers (flame or smoke) for projectiles and fuses which are assembled integral with such ammunition, do not require separate storage as pyrotechnics, but are stored with the ammunition with which assembled.

5. Pyrotechnic ammunition shall not be exposed to the direct rays of the sun.

SIGNAL PROJECTOR MARK I

Care in operation.—It must be remembered that the projector is a missile-throwing gun. The charge is approximately twice as great as an ordinary shotgun charge.

1. Care must be taken to point the projector in a direction well clear of other craft. It should preferably be pointed downwind. The signal when fired spins end over end; ejection of the signal components from the case may be in any direction, the reaction of the ejection charge giving the signal case considerable impetus. The case flies as a missile, base down, gaining sufficient velocity to bury itself in soft earth.

2. The signal is subject to misfire and hangfire just as any other ammunition primed with a percussion primer. Care must be taken not to be too hasty in removing a signal which fails to fire.

3. Care must be taken not to drop a second signal down the projector on top of an unfired signal.

4. Prior to firing, the projector should be inspected to see that the valve is in working order and is open. A closed valve will cause the air to cushion the signal and prevent it from firing. On the other hand, if the valve is jammed in the open position (by a piece of lead or other foreign matter), the pressure will be vented so rapidly that the signal will be ejected only to a height of 50 to 100 feet. The signal is designed to have the lead pressure-retaining disk rupture rather than shear. This disk may shear in occasional signals, causing small lead disks to be left in the breech about the valve gear. The valve

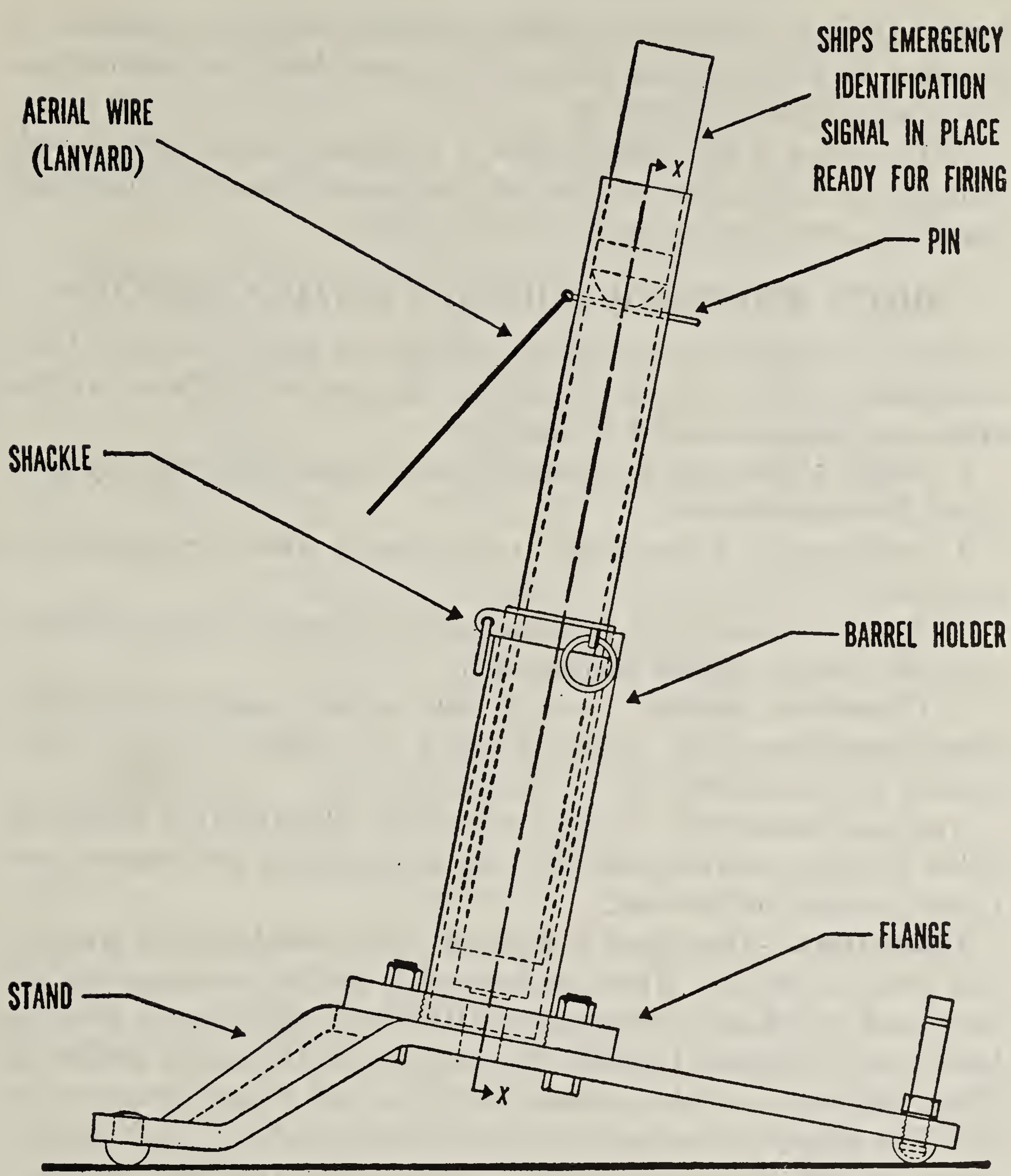

SHIPS EMERGENCY IDENTIFICATION SIGNAL IN PLACE READY FOR FIRING
AERIAL WIRE (LANYARD)
X
PIN
SHACKLE
BARREL HOLDER
FLANGE
STAND
X

FIGURE 45-1.—Signal projector, Mark I.

screen is provided to retain such foreign matter and permit repeated shots without cleaning.

5. After firing, when further use is not in immediate prospect, the projector should be disassembled and cleaned.

6. Enlargement of the bore by corrosion and cleaning with abrasives will materially affect the height of projection of the signal. Such enlargement may even permit the obturating cup to rupture. The projector should normally be stowed below decks, suitably pro-

tected. During protracted stand-by periods when the projector is mounted on deck, the bore and working parts should be suitably protected with a film of light oil.

7. The stand of the Mark I, Mod. 1 projector may be permanently mounted on submarines as desired. The barrel, however, habitually should be struck below prior to submerging.

SHIP'S EMERGENCY IDENTIFICATION SIGNALS

Ship's emergency identification signals are self-contained, aluminum-bodied cases to be dropped into the projector. There are five different signals embodied in this type:

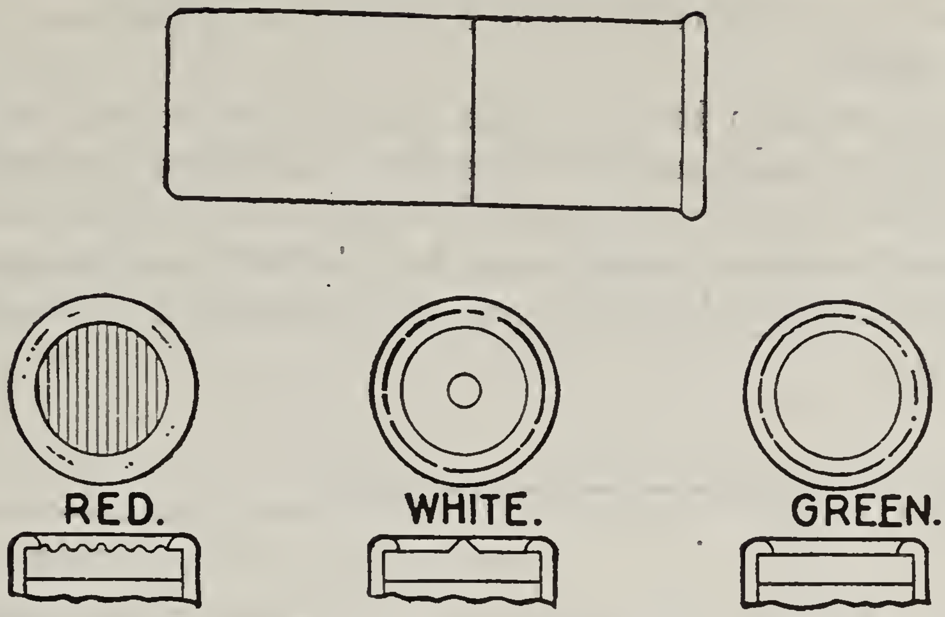
1. *Smoke signals.* Black, green, yellow, or red. (Suspended by parachute, for daytime use.)
2. *Star signals.* A single star, red, green or white. (Suspended by parachute.)
3. *Shower signals.* Give two showers two seconds apart, red, green or white. (No parachute suspension.)
4. *Chameleon signals.* A single star which changes color three times, red-green-white, green-white-red, or white-red-green. (Suspended by parachute.)

You can identify the various emergency identification signals by either the color markings on the case or by feeling the characteristic raised portions on the case.

Operation.—The signal is inserted in the muzzle of the projector and rests on the pin. When the lanyard is pulled, removing the pin, the signal, which has a clearance of 0.025 inch, slides freely down the bore, the air venting through the open valve. The signal strikes the firing pin-valve assembly, closes the valve, and causes the primer to fire. The primer gases ignite the delay train, and also flash through to the propelling-charge chamber, igniting the propelling charge. A pressure is built up within the propelling-charge chamber, expanding the copper obturating cup outward against the bore of the projector, and then blowing out through the lead pressure-retaining disk, causing projection of the signal to a height of about 600 feet. At approximately the top of the trajectory, the delay train flashes into the ejection charge, which ignites, and causes ignition and ejection of the signal components from the signal case.

VERY'S SIGNALS

These signals are fired from the Very pistol which is a simple, single-loading type, with a steel barrel about 9 inches long and ta-



NIGHT DISTINCTION TOPS, WITH DIFFERENT SHAPES, AS SHOWN.

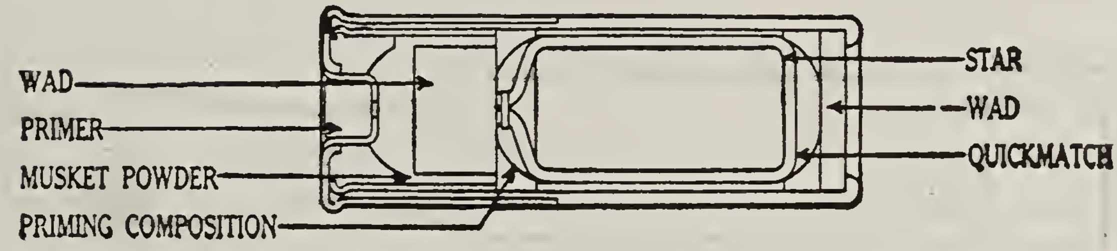


FIGURE 45-2.—Very's cartridge.

pered at the muzzle. To open the pistol for loading, press in on the barrel catch (thumb latch nut), and press down on the muzzle end of the barrel. Insert the cartridge and return the barrel to its original position. Be sure that the barrel is locked when closed. The pistols are made single-, double-, and triple-barreled, though the single-barreled type is the one most frequently seen aboard ship.

The Very cartridge is a 10 gage, center fire, brass head, standard paper shotgun shell with primer. Very's cartridges are red, green, and white, and each has a firing charge of about 25 grains of musket powder and a star. The cartridges containing the different colored stars may be distinguished by the color and surface of the wad in the end.

The stars are packed 10 to a cardboard box, each star cartridge in a separate compartment. The boxes are dipped in wax to keep out the moisture. The Very pistol, with the different kinds of cartridges, is issued for use by all lifeboats and kept in a special design metal stowage box. Coxswains should know the exact location of this stowage box, and how to load and fire the pistol properly.

Never fire a Very cartridge in a shotgun, or a shotgun cartridge in a Very pistol.

The ammunition in the bridge stowage box should be inspected frequently to make sure that the Very cartridges have not become wet and too large for the pistol. This may often happen when a box has been opened and partly used. Any partially used boxes should be carefully rewrapped with paper and shellacked, to keep out the moisture.

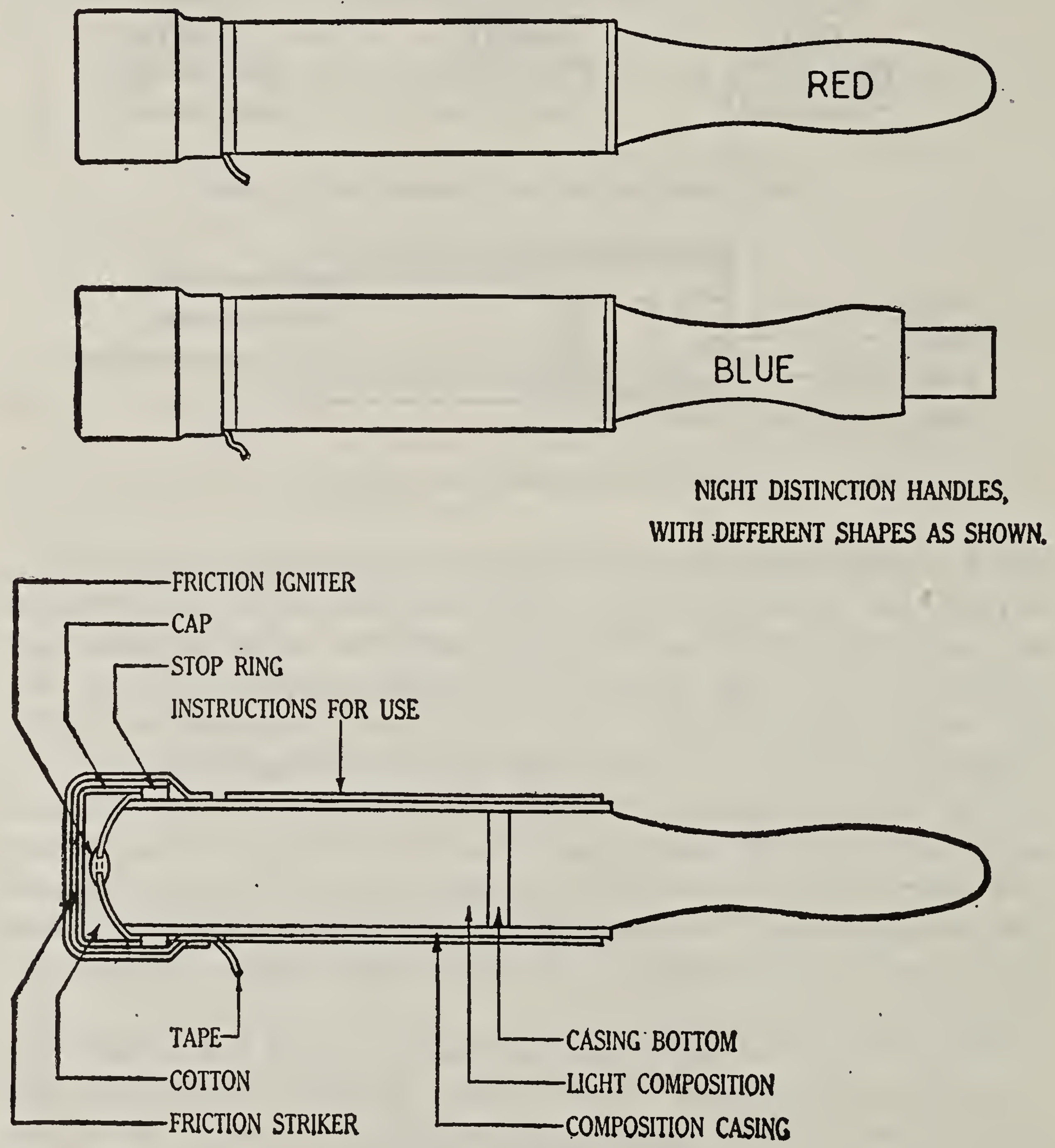


FIGURE 45-3.—Signal lights.

FLARES OR SIGNAL LIGHTS

Signal lights are put up in short tubes with wooden handles for use in the hand.

Signal lights or flares are issued in two colors, blue and red. A special composition which gives off a colored light when properly ignited is contained within the tube. To operate, remove the cap, invert, and scrape it across the upper end of the tube, thus causing ignition in a manner similar to striking a match on a box, but do not hold the light vertically, as burning particles will drop from it. As small particles from the burning composition may ignite the deck or other articles nearby, great care should be exercised in selecting the proper place for burning the light.

Note that the handle of the red flare has a different shape from that of the blue. This is done so that the proper light may be selected by feel alone, for work at night.

The whole light is wrapped with paper, waterproofed, and fitted with a tear-off strip for removing the outer covering. These lights are designed to burn for about 2½ minutes. The flares are provided in water-tight metal boxes, 6 or 12 per box. One container of 12 flares is provided for each lifeboat. For large ships, containers of 12 flares are provided for each boat, and containers of 6 flares are provided for each lifeboat. For small vessels, i.e., destroyers, gunboats, submarines, and other light vessels, containers of 6 flares are provided for each boat.

ABANDONED SHIP SIGNALING KIT

A hermetically sealed signaling kit is being furnished for each life raft and floater net. It consists of 12 varied cartridges, 4 of each color, red, green and white, in plastic capsules and a small hand firing device or projector. This is all placed in a screw top plastic container, which in turn is enclosed in a metal can similar to a sealed coffee can.

When it is desired to attract attention to the raft, the can is opened by means of a key attached to the top of the can. In order to load the projector, the barrel is removed and a cartridge inserted. The projector is then reassembled and the safety opened. It is now ready for firing, which can be done either by striking the end against some hard object or the palm of the hand, or by pulling the firing pin back and releasing it. When firing, hold the projector as far from the face as possible.

DISTRESS SIGNALS

A vessel which is in distress and requires assistance either from other vessels or from the shore shall signify this by making use of any or all of the below-listed distress signals.

Day distress signals.—

1. A gun or other explosive signal fired at intervals of about 1 minute.

2. The International Code signal of distress as indicated by the hoist NC (Negat Charlie).

3. The distant distress signal, which consists of a hoist of a square flag having either above or below it a ball or anything resembling a ball.

4. The continuous sounding of any fog signal apparatus.

5. The signal SOS by radio or by any other distress signaling method.

Distress signals by night.—

1. A gun or other explosive signal fired at intervals of about 1 minute as above for daytime.

2. Flames on the vessel (as from a burning tar barrel, oil barrel, etc.).

3. Rockets, shells or bombs throwing stars of any color or description, fired singly at short intervals.

4. The continuous sounding of any fog signal apparatus.

5. The signal SOS by radio or any other distance signaling method.

Distress signals for submarines only.—

1. A red smoke bomb indicates that the submarine is in serious trouble and requires assistance.

2. A yellow smoke bomb indicates that the submarine is in trouble necessitating her surfacing immediately. Clear the immediate area so that the submarine can do so.

Man overboard.—The following Very's pistol signals are authorized for use at night by a boat engaged in picking up a man overboard:

1. A white star	Have picked up man.
2. A red star	Need assistance.
3. A green star	Cannot find man.

STORM WARNINGS

In United States waters, information regarding the weather and the approach of storms is furnished the mariner by the Weather Bureau of the Department of Agriculture. This information is disseminated by means of bulletins, reports furnished the newspapers, radio broadcasts, and in certain seaport towns by the display of flags by day and of lanterns by night. Storm warnings are signals from stations ashore by means of a system of flags and pennants or lights. The flags are 8 feet square and the pennants have a hoist of 8 feet and a fly of 15 feet. The night equivalent of these signals consists of a system of lights arranged in a vertical line.

The warnings adopted by the United States Weather Bureau for announcing the approach of wind storms are as follows. They are illustrated in the color plate on page xv at the front of this manual.

DAY DISPLAYS

Storm warning flags.—A red flag with a black square center. This flag indicates that a storm of marked violence is expected (it is never used alone).

A red pennant displayed with the storm warning flag indicates an easterly wind; that is, from the north, through east to south, and that the storm center is approaching. If hoisted above the storm flag, it indicates that winds are expected from the northeast quadrant; when below, from the southeast quadrant.

A white pennant when displayed with flags indicates westerly winds; that is, from north through west to south and that the center has passed. When hoisted above the storm warning flag it indicates that winds are expected from the northwest quadrant; when below, from the southwest quadrant.

NIGHT DISPLAYS

By night the approach of storms of marked violence is indicated as follows:

Northeast winds—two red lights, one above the other.
Southeast winds—a single red light.
Southwest winds—a red light above a white light.
Northwest winds—a white light above a red light.

SMALL CRAFT

The small-craft warning, a red pennant flown alone, indicates that moderately strong winds that will interfere with the safe operation of small craft are expected. No night display of small-craft warnings is made.

Hurricane warnings.—By day, the approach of a tropical hurricane or of an extremely severe and dangerous storm is indicated by the display of two storm-warning flags, one above the other. The night display consists of two red lights with a white light between them.

The above storm signals or warnings indicate the weather forecast for the next succeeding 24 hours commencing at 0800 of the day of display.

The above storm signals apply to United States waters only.

SIGNALS OF THE COAST GUARD

Upon the discovery of a wreck by night, the life-saving force will burn a red pyrotechnic light or a red rocket to signify *You are seen; assistance will be given as soon as possible.*

A red flag waved on shore by day, or a red light, red rocket, or red Roman candle displayed by night, will signify *Haul away.*

A white flag waved on shore by day, or white light slowly swung back and forth, or a white rocket or white Roman candle fired by night, will signify *Slack away.*

Two flags, one red and one white, waved at the same time on shore by day, or two lights, one red and one white, slowly swung at the same time, or a blue pyrotechnic light burned by night signify *Do not attempt to land in your own boats. It is impossible.*

A man on shore beckoning by day, or two torches burning near together by night, signify *This is the best place to land.*

FIGURE 46-1

CHAPTER 46

The Telephone Talker

A sound-powered telephone system is one in which the only power on the line comes from the spoken voice rather than from batteries. Sound waves from speech strike a thin plate, and a needle attached to this diaphragm transmits electrical impulses through the wires to an ear piece where another coil, needle and diaphragm change the current to speech again. When the phones are in good condition and the voice is strong and clear, sufficient current is generated to carry the voice to everyone on the circuit.

Interior communications.—In nearly every case, information regarding activities in one part of the ship which is needed in other parts is sent from station to station by means of sound-powered telephone circuits. This means that the information must be spoken by an officer, repeated by a telephone talker at the sending station, heard by the talker at the receiving station, and then repeated correctly to the officer concerned.

The job of the talker is an important one. The talker and his equipment are the nervous system of the ship. If the message is not relayed, or is incorrectly relayed, the ship may be helpless, and her entire crew may be placed in danger by a talker who does not use his voice and his phone well. Almost everyone in the Navy will make use of sound-powered phones.

It is necessary that you understand several things about the general nature of the telephones so that you can keep your equipment in good condition.

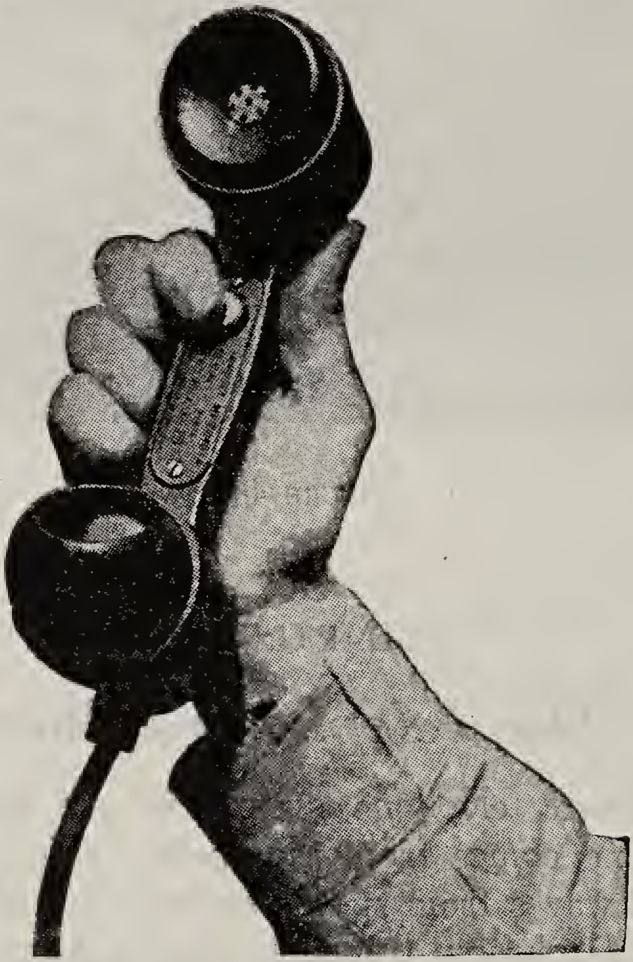


Figure 46-2.—The handset phone.

The handset telephone.—There are two types of sound-powered telephones, the handset and the headset. The handset telephone looks very much like the cradle or French type home telephone, with a receiver on one end of a bar and a transmitter on the other end. This phone is held in one hand with the receiver over one ear and the transmitter in front of the mouth. In use, this telephone differs from a home telephone in that there is a button located on the bar connecting the transmitter and the receiver. This button is pushed down each time the talker wishes to transmit, and only when the telephone is actually in use. If the button is held down at other times, all of the noise at the talker's station will go throughout the circuit and make it difficult for other talkers on the line to understand each other.

The handset telephone, when not in use, is held on a bracket on a bulkhead with a lever or spring attachment that holds it from being jarred loose. When the phone is replaced on the bulkhead the phone must be secured or it may fall to the deck and be seriously damaged.

The handset phone, although very convenient, has certain disadvantages and is used as an auxiliary to the headset phone. The headset type of phone is used more often and by many more men.

The headset telephone.—There are two parts to the headset telephone, a pair of earphones mounted in a spring metal clamp that fits on the talker's head and a transmitter mounted on a chest piece suspended on a strap around the talker's neck, so that the mouthpiece is directly in front of his mouth. There is a rubber covered wire lead from the phone, ending in a heavy metal plug called a jack. This jack fits into a jack box. On the jack box is a small circle of paint that glows in the dark so that it may be located at night. The circuit and outlet numbers are written on the jack box.

Because the headset has several rather delicate parts it must be put on properly, worn in the correct positions, and stowed with care.

In putting on the headset telephone, hold the transmitter in the left hand and hook the yoke of the earphones into the space between the chest piece and the transmitter. This will insure that the earpieces will not be dropped. Next, unhook the right side of the neck strap and fasten it around your neck. Now adjust the earphone yoke and place the earpieces on the head, taking care to have the center of the earpiece directly over the ear. If the above directions are followed, no portion of the equipment will hang by the leads. Dangling equipment soon destroys the sureness of electrical contact.

Never turn one earpiece away from the head, as this permits all

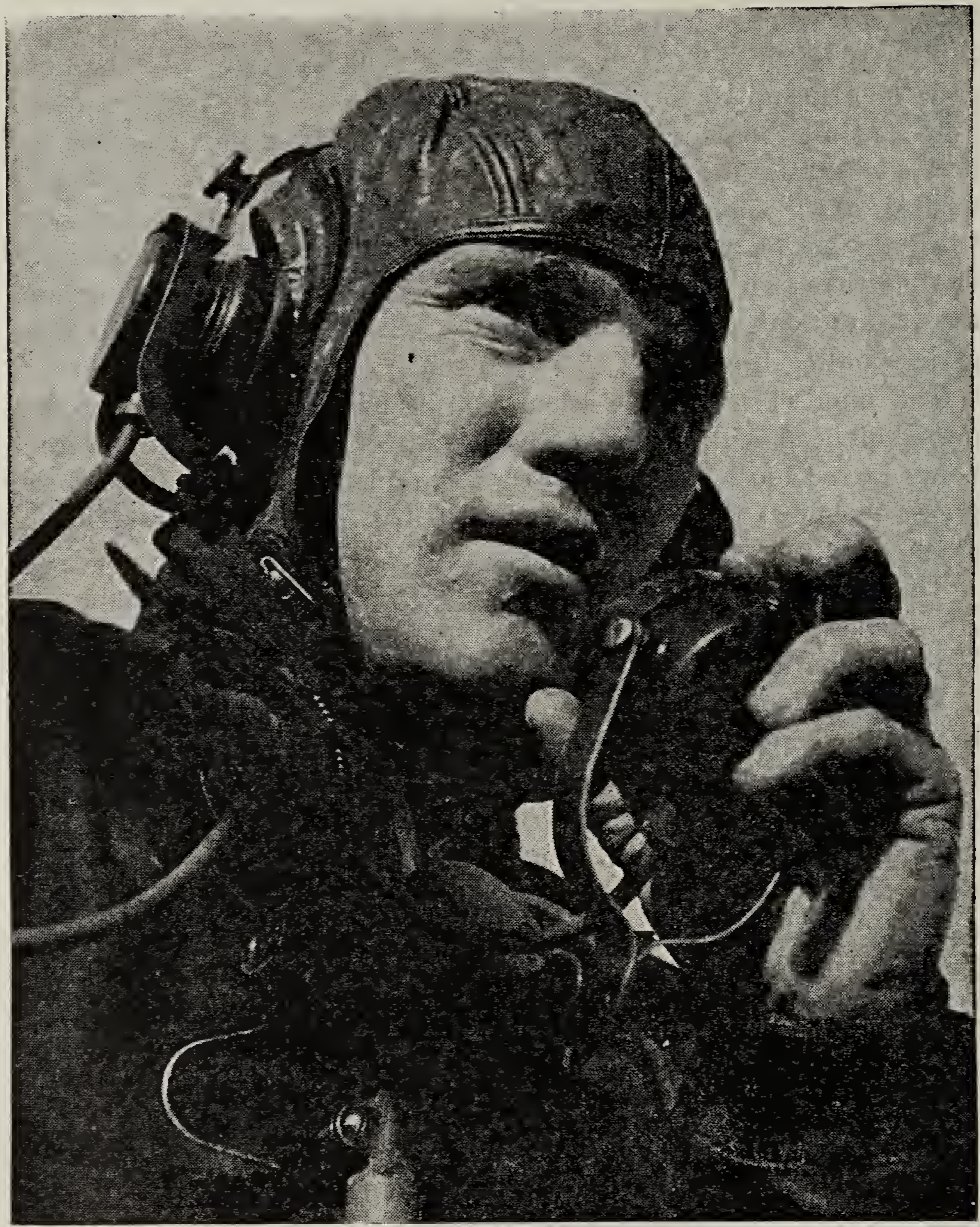


FIGURE 46-3.—The headset telephone properly adjusted.

the noises in your vicinity to be picked up and transmitted throughout the circuit. If a station is in or near a boiler or engine room, there may be so much noise that the entire circuit may become useless because one talker's phones are turned away from his head.

The fact that noise is transmitted by the earphones indicates that a single instrument can act either as a transmitter or a receiver—there is no difference between the transmitter and the receiver.

In case of a casualty to the transmitter on a headset phone, you can speak into one earpiece while listening through the other one. In case of a casualty to the earphones on a headset phone you can hold the transmitter button down and receive as well as send a message with the transmitter. In these ways communications can be maintained.

In wearing the phones make and maintain the following adjustments. First, adjust the earpieces so that the phones are directly over the ears with head band resting firmly across the top of the head. Second, adjust the transmitter so that the mouth piece is directly in front of your mouth. The face of the diaphragm should be nearly straight up and down. While speaking, your mouth should be approximately one-half inch from the transmitter. The short lead from the transmitter to the chest piece is a frequent source of trouble. The transmitter is fixed in a gimbal so that it will pivot, and for this reason care must be taken so that the transmitter is not twisted around in such a manner that the short wire lead is subject to a sharp bend that will break it. Remember, too, that you are tied down when wearing the phones. If you forget this, you may walk beyond the length of the cord and break it at the plug. Plug in the phone firmly. If there is a screw collar, see that it is turned on properly.

When you have plugged into the jack box you are ready to listen. In order to transmit your voice you will have to push the button which is directly on top of the mouthpiece. This button should be held down only when the talker wishes to speak. The practice of putting a rubber band or tape around the piece to hold the button down is in general a bad one. Do not fasten the button down unless authorized to do so. A button held down results in the same effect as having one earpiece outward. Noise will be fed into every set of phones in the circuit. Phonograph recordings made on shipboard show that when this is done, the telephone circuit may become almost useless. However, while talking, this button must be pushed down firmly and held all the way down as long as the talker is speaking, for, otherwise, his message will be interrupted and will not get through.

Never secure the phones without first having permission to do so.

In securing the phones, unscrew the collar, and take hold of the plug and pull it from the jack box. Never pull on the lead wire to remove the plug, for this will break the wire. Replace the screw cover on the jack box. Whenever the jack is removed, this cover must be immediately screwed back in place. Weather, dirt and dust will soon render it inefficient or useless if it is left open. A cover hanging on its chain is a sign that someone was not thinking. If you see an uncovered jack box, cover it.

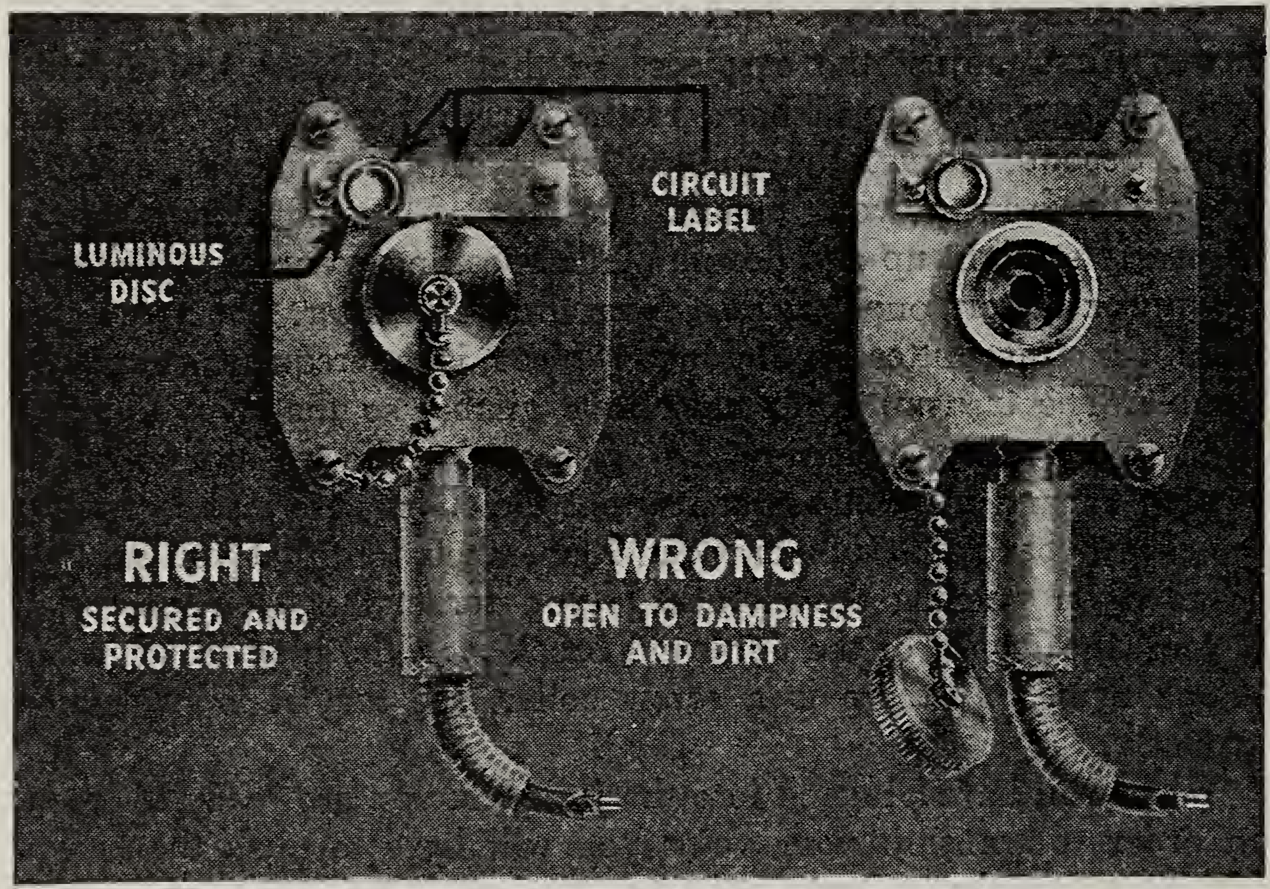


FIGURE 46-4.—Jack boxes, one properly secured.

The following method of making up, or otherwise stowing the phones, will suit most conditions. Hang the phones over the transmitter and carefully coil the lead wire. If the plug is out of the jack box, and on the deck, kinks will be unlikely to form in the lead wire. Fold the transmitter, and secure all phone parts with the neck strap. The phones may now be stowed in the box provided for them. Close the box properly so that salt air or water will not come in contact with the phones. Below decks the phone may be hung on a hook in some cases.

Phones must be unplugged no matter what the method of securing. Phones left plugged will pick up noise and feed it into the circuit.

An especially dangerous act is that of placing phones on the deck which catches the surrounding noise and sends it into the phones with great force.

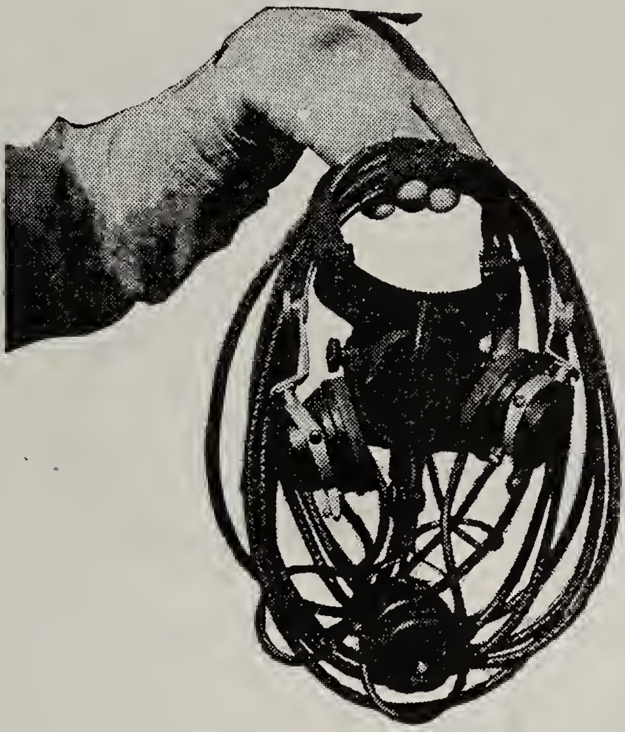


FIGURE 46-5.—Proper coil and phone package.

Transmission characteristics of sound-powered phones.—This type of telephone needs no outside source of electricity. Your voice supplies the current. There is no line noise or line buzz on the phone, except what is allowed to enter by careless handling.

Because this phone operates with the power of your voice, that voice must supply sufficient energy so you may be heard by as many as twenty or thirty men on your telephone circuit. A strong voice means lots of power; a weak voice, little power. Another way of saying this is that no matter what you say or how clearly you say it, lacking power, your message will not get through.

Telephone circuits.—Sound-powered telephones are linked together to form circuits. Each circuit has a name and number. Each outlet on a circuit has a number. Primary circuits are lettered from JA to JZ. The number of circuits will vary with the size of the ship. A large ship will have as many phones as a large office building; even a small ship will have several phones.

The JA circuit.—This is the captain's primary battle circuit. It connects the captain with numerous stations such as forward control,

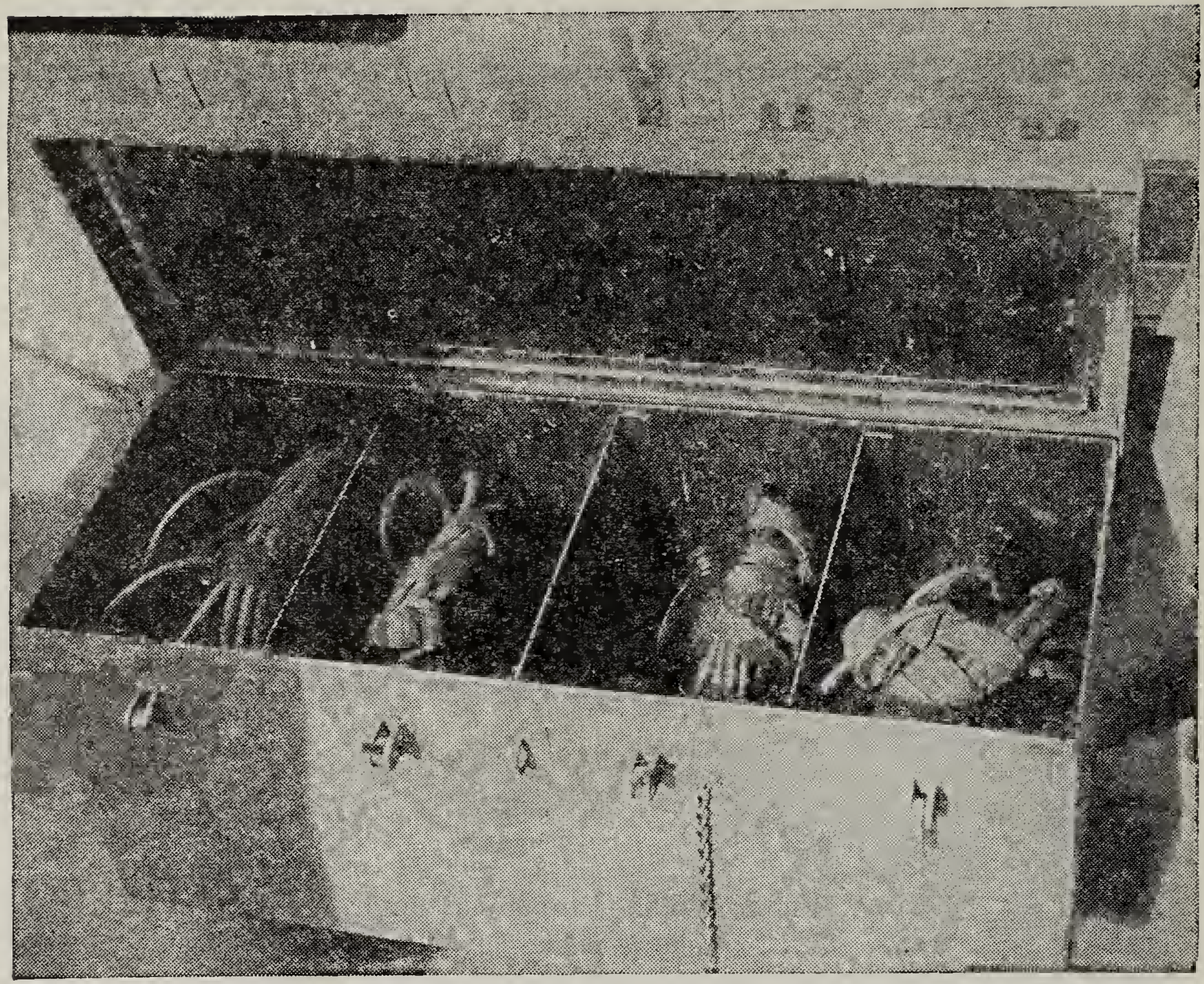


FIGURE 46-6.—Phones properly stowed.

after control, sky control, combat information center and damage control. This is the main fighting circuit of the ship. Over it the captain gives orders to the senior officers, and receives reports of the progress of the action.

The 1JV circuit.—This is the primary maneuvering circuit and it connects the captain with such stations as the forward and after engine rooms, the forecastle, the fantail, the different mooring stations, and the after steering station. Over this circuit the captain communicates with everyone who has anything to do with the movement of the ship, direction or speed.

In addition to these and other primary circuits, there are a certain number of secondary or auxiliary circuits. For example, in addition to the JA circuit, there is also an XJA circuit. This circuit has outlets in most of the same places that the JA circuit does. It serves to act as a standby between stations. These auxiliary circuits are designated by the same letters as the primary circuits, except that they have the letter X in front of the label.

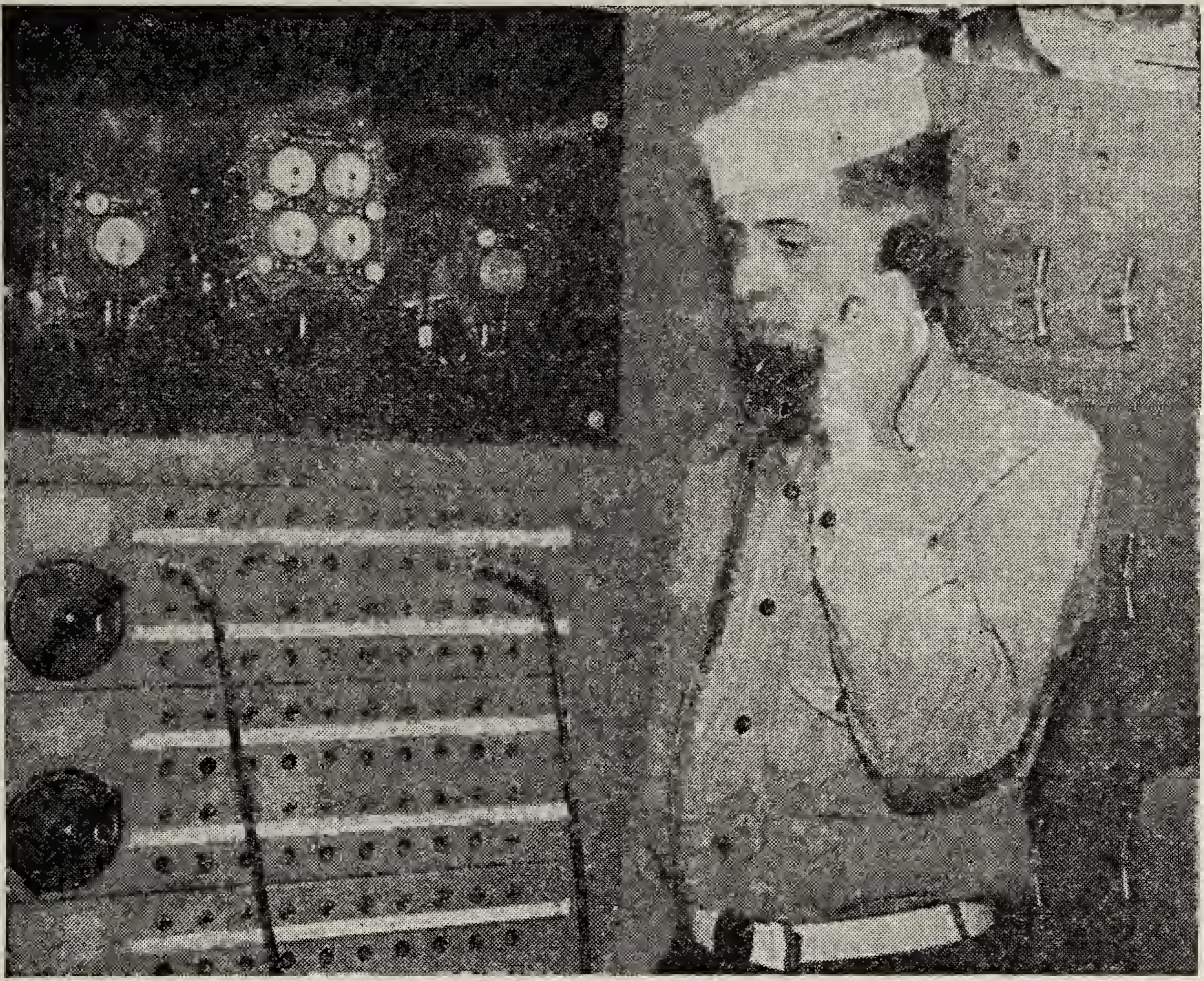


FIGURE 46-7.—Telephone switchboard.

By means of switchboards, it is possible to tie certain circuits together or to cut out parts of a circuit. For example, during fueling it may be desirable for the chief engineer to have all the stations on one circuit connected with all the stations on another circuit. This can be done by means of a tie switch connecting the two circuits. In case a part of a circuit is shorted, that part of the circuit can be disconnected by means of central switchboards.

Speaking over sound-powered phones.—The fact that you can be heard clearly in room conversation does not necessarily mean that you can be heard over sound-powered phones. You recall that it requires especially good speech to create a current and send a message at the same time.

1. Talk in a loud voice and maintain your loudness so that every word gets through to every man on the circuit.
2. Hold the transmitter not more than one-half inch from your mouth so that the waves of energy from your voice vibrate the diaphragm sufficiently to create a strong electrical current.

3. Articulate clearly. This means to move the lips, the tongue and the other organs of speech in such a way that each sound is made correctly and clearly. For example when you say, "oh," the lips should be definitely rounded. An ēē will be clearer if the lips are pulled back a little at the corners. Watch the mouth and lip movements of a good talker. In order to articulate clearly keep gum or food out of your mouth while standing a phone watch. Don't talk out of the corner of your mouth—talk from the front of your mouth. You must project your voice to everybody on the ship.

4. Talk slowly. A slowly spoken message that is understood will get over the line much more quickly than a rapidly spoken one that has to be repeated. When you have to repeat a message, get angry with yourself, not at your listeners. Excitement will be the greatest cause of too rapid speech. Excitement is usually caused by a critical situation such as a battle or battle practice. During such times, try to remember that it is doubly important to get the message through. Talk slowly and some of your own excitement will disappear. If you are calm and sure of yourself, you will influence other men on your circuit to behave in the same way.

5. Use special ship's terms with great clarity. Make every part of the message stand out. For example, the phrase, "prepare to stream paravanes" may be unfamiliar to your listener, so say, "pre-pare to stream par-a-vanes." The underlined sounds are those likely to be slighted, so make them clear—especially because the terms may be unfamiliar, and because each word is an important part of the message.

6. Restrict your dialect or accent. Each one of us has a way of speech which tells others which part of the country he is from. Try to speak in such a way that your listeners will not be able to tell that you are from the South, New England, or the West.

Take especial care with numbers because they often supply information that if misunderstood would spell disaster. Examples of such information might be the depth of water under the keel, the bearing and range of other ships or of planes. Say the numbers from one through ten. Pronounce the numbers in the following way. "*Zē-ro, one, two, thu-ree, four, fīīve, six, se-ven, eight, niner.*"

Circuit discipline.—Standing a phone watch is not always exciting. You may stand with the phones over your ears for hours at a time, and nothing of great importance will be passed over the telephone circuit. At such times it is easy to become careless and take part in private conversation with others on the circuit. Recordings made on shipboard show that several talkers may take part in such conversations and so clutter the circuits that they are useless for emergencies.

Remember that when an emergency arises—and it may arise any time—the life of the ship and crew depends upon good interior communications—the lives of many men depend upon you as a link in that communication chain. You have heard that "a chain is only as strong as its weakest link." Unauthorized talking means that there are at least two weak links in the chain. On board ship, the passing of vital orders will only be as effective as the weakest talkers on the circuit. See to it that you are efficient.

The talker must be as much like a machine as possible. He must pass and receive over his circuit the exact message originated by an officer. No matter what the excitement, he must carry on and talk slowly, calmly and clearly. A talker must never become angry because the circuit is jammed, but must know how to go about the job of getting his information through in a cool and efficient manner. Effective circuit discipline depends upon self-control on the part of every individual talker.

Information must be transmitted aboard ship accurately and rapidly. In order to accomplish this, certain standards of procedure and standard commands have been established. These rules have been proved to be best through experience, and any changes which a talker thinks better are probably not good. In any event each talker must understand that standardized procedure and commands are a necessity. We must all do the same things the same way.

Calling.—Every message, excepting a mere acknowledgement, must begin with the name of the station you are calling, and the name of the station originating the message. For example:

"Bridge, main control ...."

or

"Turret one, plot ...."

Acknowledging.—When a message is transmitted to a station, it must be acknowledged immediately if it is received. This is done by saying the name of the station receiving the message and then, "Aye, aye." For example, the bridge wants to secure all lookouts. The JL talker on the bridge says, "All stations, bridge; secure all lookouts." Then, each lookout must acknowledge by saying, "Foretop lookout, aye, aye," or "Fo'c'sle lookout, aye, aye." Where stations are numbered, they should always acknowledge in numerical order, so that there is no jamming of the circuit. Do not wait too long for another station to acknowledge first—continue in regular order and let the station which has missed out come in at the end.

When the message is in the form of a question, the message should be acknowledged at once, even if the answer is not ready. For example, the bridge asks main engine control as follows, "Main engine control, bridge; what boilers are on the line?" Main engine control immediately answers, "Main engine control aye, aye; wait." Then when the talker gets the information he forwards it to the bridge as follows, "Bridge, main engine control; boilers 2, 3, and 4 are on the line." Then the bridge must acknowledge receipt of this information by saying, "Bridge, aye, aye."

Repeating back.—There are certain times when a message is particularly important and the officer originating the message will want to make sure that it has been transmitted and received correctly. In this case he will tell his talker to have the receiving station repeat it back. For example, the bridge wants the first lieutenant on the forecastle to veer fifteen fathoms on the starboard anchor chain and then report the strain. The bridge talker says, "Fo'c'sle, bridge; tell the first lieutenant to veer fifteen fathoms on the starboard anchor chain and then report the strain. Repeat back." The fo'c'sle talker must then repeat the message exactly, as follows, "Bridge, fo'c'sle; tell the first lieutenant to veer fifteen fathoms on the starboard anchor chain and then report the strain." Bridge, of course, must acknowledge with, "Bridge, aye, aye," if the message has been repeated back properly.

Requesting repeats.—Sometimes a message does not get through. The talker may not be able to hear or there may be some other interference. In this case, the talker at the receiving end should say, "Repeat." For example, damage control wishes to tell repair two to send a submersible pump to repair three. Damage control's talker says, "Repair two, damage control, send one submersible pump to repair three." Repair two does not receive this, so the talker there says simply, "Repeat." Damage control then repeats the message.

Brevity.—To make communications rapid, the messages must be kept short and concise. This is a matter which primarily concerns the officer originating the message, but talkers must also keep this principle in mind. All extra words must be cut. The words, "please," or "sir," for example, have no place on telephone circuits. If a message must be long it may be grouped into phrases.

Silence on the line.—Occasionally when a circuit is in use by two stations it becomes necessary for the control station on that circuit to get through an important message. In such a case, the control talker will say, "Silence on the line." Whenever this is heard all other communications must stop immediately and the control station will be free to get out its message. By control station is meant a station like the bridge, damage control, or main engine control, where orders and commands originate.

General rules.—Letters should never be spoken as letters, but by their proper names as given in the standard Navy phonetic alphabet. (See chapter 44, figures 44-2 and 44-3.) Bee, Dee, Cee, Zee, Gee and Tee sound too much alike. But, Baker, Dog, Charlie and Zebra are intended for use in spoken messages and should be used. For example never say, "Compartment A-307-L." Say instead, "Compartment able three zero seven love."

Numbers should be spoken with each individual digit pronounced. Note the following examples:

Wrong	*Correct*
Course three hundred	Course three zero zero
Range three hundred	Range three double-oh*
Range forty-five thousand	Range four five oh double-oh*
Speed eighteen knots	Speed one eight knots
Make three hundred and five turns	Make three zero five RPM
Compartment A five fifteen E	Compartment Able five one five Easy

* Note: For gunnery purposes "Zero" is spoken as "oh" and "zero zero" is spoken as "double-oh."

When you have a series of numbers, space them so that they may be easily understood. For example, when saying or repeating "Range four five oh double-oh," say, "Range four five," then make the "oh" stand out by waiting a moment and by saying it more loudly, and go on to the rest of the message. Like this, "Range four five........*oh*........double-oh.

Use standard words or phrases such as "aye, aye," "repeat," and "manned and ready."

Do not use slang or profanity. Use only correct nautical terms together with correct everyday English.

Know your ship and her language.—A good talker will do a better job if he knows what he is talking about, has a general knowledge of the whole ship, and has a detailed knowledge of what goes on at his station and at the other stations on his circuit. Suppose a talker hears, "Main control from fireroom two......we are making out." Now this appears to be a sensible message, but what the talker should have said was, "Main control from fireroom two......we are baking out." This means that a boiler is being baked out and that for the moment it cannot be put into service. The message, "making out," could easily be interpreted as "making out all right," which might mean that the boiler was in condition to operate at full efficiency when actually it could not at the moment operate at all. Be prepared for the time when it will become your responsibility to use the sound-powered telephone.

GLOSSARY OF NAVY TERMS AND PHRASES

GLOSSARY OF NAVY TERMS AND PHRASES

A

Abaft: behind, or farther aft. The mainmast is abaft the foremast.

Abeam: at right angles to the center line of the ship. Refers to an object outside the ship.

Aboard: on or in a ship. *Close aboard* means near a ship.

Abreast: opposite to or bearing 90° from ahead.

Accommodation ladder: steps leading down a ship's side used for boarding.

Ack Ack: slang for antiaircraft fire.

Acknowledgment: a statement that a message has been received, usually "Aye, Aye."

Adrift: loose from moorings or out of place.

Afloat: resting bouyantly upon the water.

Aft: at, near, or in the direction of the stern.

Aground: resting on or touching the ground, or bottom.

Ahead: forward of the bow.

Ahoy: term used to hail a boat or ship.

Airplane crane: crane used for hoisting planes from the hangar to the deck or on board ship.

All hands: refers to the entire ship's company.

Allotment: assignment of a definite amount of money to be paid to a specific person or company from the pay of an officer or enlisted man.

Allowance: money paid partly by the Government and partly by an enlisted man to his family or dependents for their support.

Aloft: above the uppermost deck; over head.

Alongside: beside a pier, dock or ship.

Amidships: in the line of the keel; sometimes half way between the bow and stern.

Anchor: a large, heavy metal hook so shaped as to grip the bottom and hold a ship by the chain or line attached.

Anchorage: suitable place to anchor; a special area set apart for anchoring ships.

Anchor aweigh: said of the anchor when it is just clear of the bottom.

Anchor buoy: a small buoy secured to the crown of an anchor by a light line; usually painted a distinctive color and used to indicate the position of the anchor when it is on the bottom.

Anchor light: white light visible all around the horizon displayed by a ship at anchor.

Anchor watch: a detail of men stationed on deck at night as a safety precaution when at anchor.

Antenna: coil or length of wire used for radio transmission or reception aboard ship.

Anticorrosive paint: the coat of paint applied to the ship's bottom to prevent corrosion.

Antifouling paint: the coat of paint applied on top of the anticorrosive paint to prevent fouling of the ship's bottom.

AOL: absent over leave. This is a breach of Naval discipline.

Armament: the guns and other weapons carried by a ship or plane.

Arming the lead: placing tallow or wax in the cavity at the bottom of the lead to bring up a sample of the bottom.

Armor: the protective layers of heavy metal used to guard the vital parts of a ship.

Armor belt: the belt of armor carried on a warship just above and below the water line.

Artificer: a skilled mechanic or craftsman in one of the mechanical branches of the Navy.

Ash can: slang for depth charge.

Ashore: on the shore.

Astern: behind the ship; on a bearing of 180° from ahead.

Athwart: at right angles to the center line of a ship.

Athwartships: in a direction at right angles to the center line.

Auxiliary: an assisting machine or vessel, such as an air-conditioning machine or a fuel ship.

Avast: an order to stop or to cease.

Awash: a vessel so low in the water that the water is constantly washing over the side.

Aweigh: refers to the anchor being just off the bottom.

AWOL: absent without leave. A breach of Naval discipline.

Aye, Aye: used by enlisted men to each other to show that a message is understood and will be passed on, as over the phone, "Bridge aye aye."

Aye, Aye, Sir: used by subordinates to seniors in acknowledging an order or command signifying that it is understood and will be carried out.

B

Backstay: a stay supporting a mast from aft.

Backwash: water thrown aft by the turning of the screw.

Bail: to dip water out of boat with a bucket.

Ballast: heavy weights in the hold of a vessel or ship to increase stability by lowering center of gravity.

Barbette: a heavily armored cylinder extending from the armored upper part of a turret down to the lowest armored deck, within which the turret rotates.

Barge: a ship's boat designated for use of flag officers; the Admiral's barge.

Barnacle: a small shellfish which attaches itself to the sides and bottom of ships, piers and driftwood.

Barometer: an instrument registering atmospheric pressure, used in forecasting weather.

Batten down: to close or make watertight, usually referring to hatches.

Battle lights: red lights used to prevent showing of light for any distance, but giving sufficient illumination for use nearby.

Battle wagon: slang for battleship.

Beacon: an aid to navigation placed on or near a danger spot, usually unlighted.

Beam: the greatest width of a ship; an athwartships timber or steel channel.

Bear a hand: speed up work, or lend a hand.

Bearing: the direction of an object expressed either in terms of compass points or degrees.

Becket: a rope eye for the hook of a block; a rope grommet used in place of a rowlock.

Belay: to make fast; to stop; to cancel an order.

Below: beneath the main deck.

Bend: to make fast, such as bending a cable to an anchor; a knot used in joining two lines.

Bending shackle: device used to secure the anchor chain to the anchor.

Berth: an area or position for a ship to moor or anchor.

Bilge: the curved part of a ship's hull where the sides and flat bottom meet.

Bilged: a ship stove in, at or near the bilge; failed in an examination, or discharged because of failure.

Bilge water: water accumulated in the bilge by seepage or leakage.

Billet: an allotted place to sleep; refers also to a particular man's duties aboard ship.

Binnacle: a stand made of brass or other non-magnetic material used to house the compass.

Binnacle list: the sick list including the names of those excused from duty by the Medical Officer.

Biplane: a two-winged airplane.

Bitter end: the inboard end of a line or the last link of a cable.

Bitts: a pair of iron or wooden heads set vertically in the deck to which mooring or towing lines are secured.

Blade: the broad, flat part of an oar which enters the water.

Blinker: a set of lights at the masthead or on the end of a yardarm, connected to a telegraph key and used for sending flashing light signals.

Blister: a bulge built in a warship's side as a protection against torpedoes, capable of being flooded or pumped out to control list and trim.

Block: a device consisting of a frame made of wood or metal supporting a sheave over which line or cable runs.

Blockbuster: slang for the heaviest and most powerful type of aerial bomb.

Bluejacket: a seaman in the United States Navy.

Boat: a small vessel which can be hoisted onto or carried by a ship.

Boat boom: a boom swung out from the ship's side when at anchor to which boats secure.

Boat fall: a purchase of two blocks and a length of line used to hoist a boat to its davits.

Boat hook: a wooden staff with a metal hook at one end used to fend off or hold on.

Boat recall: signal from a ship to recall a particular boat.

Bo'sn's chair: a seat, consisting of a short board fastened in the end of a line, on which a man may be suspended for working aloft or over the side.

Bo'sn's locker: the locker in which a bo'sn keeps deck gear.

Bo'sn's pipe: a small, shrill whistle used by the bo'sn's mate in passing a call or in piping the side.

Boat the oars: a command for pulling the oars out of the water and putting them into the boat.

Bollard: an upright wooden or iron post on a dock to which hawsers can be secured.

Booby hatch: a wooden hood covering a small hatchway.

Boom: a spar used to extend the foot of a sail; a line of logs secured together to prevent the passage of boats; a spar with a special use, such as a boat boom.

Boot: slang for a new recruit; slang for leggings.

Boot camp: slang for a station or shore establishment where recruits receive basic Navy training.

Boot topping: quick-drying anticorrosive paint used on and above the waterline.

Bow: forward part of a vessel.

Bower anchor: a heavy anchor carried in the forward part of the ship and ordinarily used in anchoring.

Bowline: a knot used to form a loop in a line.

Bow painter: a line to the bow of a small boat used for securing it.

Bowsprit: a spar extending forward from the bow from which headsails are set.

Boxing the compass: giving the names of the 32 points of the compass in proper order.

Break out: to unstow or prepare for use.

Breaker: small cask for fresh water.

Bridge: the raised platform in the forward part of the ship from which the ship is steered or navigated.

Bridle: a span of rope with both ends secured.

Brig: the ship's prison.

Brightwork: brass or metal work which must be polished.

Broaching to: to turn up into the wind suddenly and unintentionally; to be thrown broadside on in a surf.

Buckler: a plating fitted into a port or hawse pipe to close it.

Bulkhead: a partition separating compartments; corresponds to a wall in a building.

Bulwark (pronounced *bull'-werk*): the light plating or wooden extension of the ship's sides above the upper deck.

BuAer: abbreviation for the Bureau of Aeronautics.

BuDocks: abbreviation for the Bureau of Yards and Docks.

BuMed: abbreviation for the Bureau of Medicine and Surgery.

BuOrd: abbreviation for the Bureau of Ordnance.

BuPers: abbreviation for the Bureau of Naval Personnel.

BuSandA: abbreviation for the Bureau of Supplies and Accounts.

BuShips: abbreviation for the Bureau of Ships.

Bunk: built-in bed aboard ship.

Buoy (pronounced *boo′-i* or *boy*): a floating marker moored to the bottom which by shape and color conveys navigational information. Also used for mooring ships.

By the board: overboard.

By the head (stern): deeper forward (aft).

C

Cabin: the Captain's quarters; enclosed space of a decked-over small boat.

Cable: a chain of great strength, generally used in reference to chain or heavy rope bent to an anchor.

Cable length: a hundred fathoms or 600 feet.

Caisson (pronounced *ka′-sun*): a gate to a dry dock, either floating or sliding.

Camel: a wooden float placed between the ship and the dock for fending.

Can buoy: a cylindrical metal buoy.

Capsize: to overturn in a small boat.

Capstan: the vertical barrel situated on the forecastle geared to the windlass used in hoisting anchor.

Cardinal points: the four principal points of the compass—north, south, east, and west.

Cargo net: a heavy square rope net used for slinging cargo.

Carry away: to break or tear loose.

Carry on: an order to resume work or duties.

Casemate: armored enclosure in a ship in which guns are mounted.

Cast: to throw: turn the ship's bow in one direction or another in getting under way.

Casualty: injury to man or damage to equipment.

Cast off: to let go.

Catapult: mechanism used for launching airplanes from a ship.

Catch a crab: accidental striking of the oar blade during recovery, causing loss of control.

Cat fall: the fall used to cat an old-fashioned anchor.

Catting: getting an old-fashioned anchor to the hoisting davit.

Caulk (pronounced *kawk*): to fill in the seams with cotton or oakum.

Caulk off: slang for sleep.

Centerboard: a wooden or metal board which can be lowered from its position in the slot of a fore-and-aft trunk to overcome the leeway of a boat sailing on the wind.

Center line: imaginary straight line running from the bow to the stern of a ship.

Chafe: to wear the surface of a line or spar by rubbing.

Chafing gear: a guard of canvas or line around spars, hawsers, chocks, or rigging to prevent chafing.

Chain locker: a forward locker where chain cable is stowed.

Chains: the station for the leadsman.

Chain stopper: a short length of chain fitted with a slip hook secured to an eyebolt on the forecastle for quickly releasing the anchor and chain upon anchoring. Also used to secure the anchor and chain.

Charley noble: galley smoke-pipe.

Chart: a nautical map used as an aid in navigation.

Check: to ease off gradually; to keep a strain on a line but to slack it as necessary to avoid parting.

Chock: a wooden or metal fitting secured to the deck or dock and having two arms between which lines on cables may be passed.

Chock-a-block: when the two blocks of the tackle have been drawn as close together as possible.

Chow: slang for food.

Cinclant: abbreviation for Commander in Chief, United States Atlantic Fleet.

Cincpac: abbreviation for Commander in Chief, United States Pacific Fleet.

Clamp down: to sprinkle and swab down a deck.

Clap on: to seize a rope and haul away or to make more sail.

Clear: to leave a port with all formalities concluded; to empty; to work clear, as of a shoal; to untangle.

Cleat: a fitting of wood or metal with horns used for securing lines.

Clew: the after lower corner of a fore-and-aft sail.

Clockwise: a circular motion in the direction clock hands turn.

Close aboard: near to the ship.

Close hauled: sailing close to the wind.

Clothes stop: small cotton line used for fastening clothes to the line or for securing clothes rolled up in bags or lockers.

CNO: abbreviation for Chief of Naval Operations.

Coaming: the raised framework about deck openings and cockpits of open boats.

Cockbill: to hang an anchor vertically clear of the water.

Cockpit: the well of a sailing vessel or small boat for the wheel and steersman; the enclosure for personnel carried in aircraft.

Cofferdam: space between two bulkheads set close together, especially between fuel oil tanks and adjacent spaces.

Coil: to lay down line in circular turns.

Collision bulkhead: a watertight athwartships bulkhead a short distance abaft the bow for the purpose of confining damage due to a head-on collision.

Collision mat: a heavy square of canvas hauled under the side as a temporary plug for a leak or shell hole.

Colors: the national ensign.

Cominch: abbreviation for Commander in Chief, United States Fleet.

Command: term applied to a ship or ships under one officer; a directive indicating what to do and how to do it.

Companion ladder: a ladder between the quarter deck and officers' quarters.

Companion way: passageway on board ship.

Company: a military unit made up of two platoons or about 100 to 150 men.

Compartment: a space below deck between bulkheads, corresponding to a room of a building.

Compass: an instrument for determining courses steered and bearings by indicating magnetic or true north.

Compass rose: the diagram of the compass card indicating the 360 degrees of the compass; used on charts.

Conning: directing the steering of a ship by orders to the helmsman.

Conning tower: a heavily armored structure just forward of and slightly below the bridge for conning the ship in battle.

Convoy: a number of merchant vessels sailing under the escort of warships.

Cordage: a general term for line of all kinds.

Counter: the part of a ship's stern extending from the waterline to the overhang.

Country: the space near to a compartment or quarters, such as wardroom country.

Course: the direction steered by a vessel expressed in degrees.

Court-martial: a Naval court for the trial of serious offenses.

Cowl: the bell-shaped opening of a ventilator.

Cowling: a removable covering on aircraft, as over a cockpit or around an engine.

Coxswain (pronounced *kok′-s’n*): the enlisted man in charge of a boat and usually serving as steersman.

Cradle: a stowage rest for a ship’s boat.

Crane: a derrick used aboard ship for swinging boats or planes in and out and for hoisting heavy weights.

Crossing the line: crossing the Equator, at which time there is usually a ceremony during which the pollywog (landlubber) becomes a “shellback.”

Crow’s nest: the lookout’s platform on the mast.

Cut of the jib: general appearance of a vessel or a person.

Cutter: a double-banked, square sterned ship’s boat used for general duty.

D

Damage control: maintenance of watertight integrity of the ship during battle or storms, including necessary repairs.

Davit: a curved metal spar fitting in a socket on the deck and projecting over the side or stern of the ship for hoisting boats or handling weights.

Davey Jones’s locker: an imaginary place at the bottom of the sea.

Dead ahead: directly ahead on the extension of the keel line of the ship.

Dead head: a partially submerged spar or timber which is a menace to navigation.

Dead light: a heavy, circular glass lens set flush into decks or bulkheads to admit light or permit observation.

Dead reckoning: a navigator’s estimate of the ship’s position dependent upon course steered and distance run, independent of sights or bearings.

Dead weight (capacity): the difference between a ship’s light and loaded displacement.

Deck: corresponds to the floor of a building.

Deck tackle: a heavy double purchase used for general work on deck.

Decontamination: the act of clearing a compartment, area or clothing of poison gas.

Deep: the unmarked fathoms on a lead line.

Degaussing gear (pronounced *de-gow′-sing gear*): electrical gear which sets up magnetic fields protecting the ship from damage by magnetic mines.

Deploy: a tactical term in extended order exercises for the dispersal and arrangement of troops. Disposition of ships into battle formations.

Depth charge: an explosive charge used against submarines; actuated by water pressure when it sinks to the depth for which set; also magnetic type of depth charge.

Derelict: an abandoned vessel at sea, still afloat, constituting a menace to navigation.

Deserter: a man who is absent without permission with specific intent to abandon the Naval service permanently or to cancel the pending contract of enlistment.

Devel's claw: a strong iron hook used as a stopper for chain cable.

Diesel (pronounced *dee′-zel*): a type of oil burning, internal combustion engine used on many ships of the Navy.

Dihedral angle: the angle between the longitudinal center line of the wing of a plane and an imaginary horizontal line.

Dinghy (pronounced *ding′-gi*): a small, single-banked four-oared boat used for handy work, either 16 or 20 feet in length.

Dip: to lower a flag part way in salute or in answer, and hoist it again.

Dip rope: a length of open-link chain or wire fitted with an eye and shackle and tailed with manila rope; used in clearing hawse and in rigging a collision mat.

Director: a mechanical device for controlling the fire of guns.

Displacement: the weight of the water displaced by a ship.

Distress signal: a flag, sound, light or radio signal calling for assistance.

Ditty box: a small wooden box used by bluejackets for stowing small personal gear.

Dock: a landing pier for boats or ships; an artificial basin for the reception of ships fitted with gates to keep in or shut out water.

Dog: a type of bolt and nut used to secure watertight doors, hatch covers or manhole covers; also metal rods which are driven into blocks at the bottom of a dry dock to prevent them from floating.

Dog vane: a small strip of cloth or cord rigged to show the direction of the wind.

Dog watch: one of the two-hour watches from 1600 to 2000.

DOLDRUMS: belts on each side of the Equator in which, ordinarily, little or no wind blows.

DOLPHIN: a cluster of piles used for mooring.

DORSAL: refers to gear attached to the top of the fuselage of aircraft.

DOUBLE BANKED: a boat with two men on a thwart or two men on an oar.

DOUBLE BOTTOMS: watertight subdivisions of a ship next to the keel and between the outer and inner bottoms.

DOUBLE UP: to double a ship's securing lines.

DOWSE: to take in or lower a sail; to put out a light; to cover with water.

DRAFT: the depth of water from the surface to the ship's keel; a detail of men.

DRESSING SHIP: displaying the national colors at all mastheads and the flagstaff; full dressing requires a rainbow of flags from bow to stern over the mastheads.

DRY DOCK: a basin for receiving a vessel for repairs, capable of being pumped dry.

DUNGAREES: a blue working uniform.

DUNNAGE: loose material placed in holds for the cargo to rest on or jammed between the cargo to wedge it; a sailor's personal gear.

E

EASE OFF: slack up or pay out.

EASY: carefully.

EBB TIDE: condition along the coast when the tide is going out.

ELEVATOR: a movable section of the tail of a plane usually hinged to the stabilizer.

EMBARK: to go on board ship.

EMERGENCY SPEED: all the speed of which a ship is capable.

END FOR END: reversing the position of an object or a line.

END ON: head on.

ENGINE-ORDER TELEGRAPH: signaling gear used to transmit from the conning station to the engine-room the desired speed of the ship, forward or astern.

ENSIGN (pronounced *en'-sin*): the national flag; a junior commissioned officer in the Navy.

EVEN KEEL: floating level.

EYES: the foremost part of the weather deck in the bow of the ship.

F

Fair lead: an eye, block or fitting furnishing a clear lead for a line.

Fair tide: a tide running in the same direction as the ship.

Fairway: an open channel.

Fake: a single turn of line when line is coiled down.

Fake down: to coil down a rope so that each fake of rope overlaps the one underneath and hence the rope is clear for running.

Fall: the line used to lower and hoist a boat at the davits.

False keel: a thin covering secured to the lower side of the main keel of ships to afford protection.

Fantail: the part of the stern of the ship extending abaft the sternpost; the after section of the main deck on destroyers and cruisers.

Fast: secure.

Fathom: a unit of measurement equalling six feet.

Feather: to turn the blade of an oar horizontally at the finish of a stroke.

Feel the way: to proceed cautiously, taking soundings with the lead.

Fender: canvas, wood or rope gear used over the side to protect a ship from chafing when alongside another ship or dock.

Field day: a day for general ship cleaning.

Fin: a fixed or adjustable surface giving directional control, such as a tail fin on a plane.

Fire control: the control of gunfire or torpedo fire aboard ship.

Fire control tower (platform): may be either a separate structure or a part of the conning tower containing fire control equipment.

First lieutenant: the officer in charge of the construction and repair department of a ship or station.

Flag bag: container used for the stowage of signal flags, with separate slots for the different flags.

Flag officer: an officer with the rank of Commodore or above.

Flagstaff: the staff on which the ensign is hoisted.

Flank speed: a certain prescribed increment above standard speed.

Flap: a hinged surface of a wing of an airplane used to increase the lift on take-off and landing.

Flash burn: a burn received from the heat of explosion of a shell or bomb.

Flash plate: protective metal plate secured to the deck over which the anchor chain rides.

Flat keel: the external center line row of plating on a ship's bottom.

Flat top: slang for an aircraft carrier.

Fleet: a large tactical unit of warships; to shift from place to place; to draw the blocks of a tackle apart.

Flemish down: coil line flat on the deck, in a clockwise direction ("with the sun") each fake outside of the other, beginning in the middle, and all close together.

Flight deck: the deck of an aircraft carrier on which planes take off and land.

Float: a decked-over raft.

Floater net: a life net similar to a cargo net, but having corked buoys causing it to float. Such nets are used to support men in the water.

Floating dry dock: a movable dock floating in the water by which ships can be lifted from the water and repaired.

Flotsam: floating wreckage or goods thrown overboard.

Fluke: the flat end of an anchor arm which bites into the ground.

Flush deck: a continuous upper deck having no breaks, such as raised forecastle or poop decks.

Flying boat: a type of seaplane the hull of which provides flotation.

Flying bridge: a bridge on a ship having no supports and extending out from the control tower.

Fogbound: a vessel forced to lie at anchor because of fog.

Fogy (pronounced *foe'-gi*): an increase of pay due to length of service without increase in rate or rank.

Fore and aft: running in the direction of the keel.

Forecastle (fo'c'sle) (pronounced *folk'-s'l*): the upper deck forward of the foremast; a forward compartment where the crew lives.

Forecastle Deck: a partial deck at the bow over the main deck.

Forehand: to take the strain by hand on a piece of running gear inboard of the block so that it may be belayed.

Foresheets: the portion of the boat forward of the foremost thwarts.

Forestay: a stay giving support to a mast from forward of the mast.

Foretop: a heavy structure supported by the foremast in which fire control equipment is housed.

Forward: towards the bow.

Foul: jammed; not clear.

Foul anchor: an anchor with a cable or chain twisted around it.

Frame: the ribs of a ship strengthening and supporting the plating.

Frap: to pass lines around a sail to secure it from blowing loose; to pass tight wrappings of line.

Freeboard: the height of the ship's side from the waterline to the main deck or gunwale.

Full speed: a prescribed speed greater than standard speed.

Funnel: the smokestack of a ship.

Furl: to gather up and secure a sail or awning.

Fuselage (pronounced *few'-ze-lij* or *few'ze-lazh*) : the body to which the wings and tail of an airplane are attached.

G

Gaff: the spar to which the head of a fore-and-aft sail is secured; a small spar abaft the mainmast from which the national ensign is flown when under way.

Galley: the ship's kitchen.

Gangplank: a portable bridge used for boarding a ship from a dock.

Gangway: an opening in the bulwarks or the rail of the ship to give entrance; an order to stand aside and get out of the way.

Gather way: to gain headway.

Gear: general term for lines, ropes, blocks, tackle, etc.

General quarters: battle stations.

Gig: ship's boat used by the commanding officer.

Gimbals: a pair of rings, one within the other, supporting the compass and maintaining it at the horizontal.

Give way: an order to begin pulling the oars together.

Glass: a term used for a barometer; also for optical instruments, such as binoculars or telescope.

Glider: an engineless airplane.

Go adrift: to break loose.

Goldbrick: slang for a loafer.

Grab rope: a line secured waist high above a boat boom or gangplank used for steadying oneself.

Grapnel: a small anchor having several arms and used for dragging purposes.

Graveyard watch: the middle watch from 2400 to 0400.

Gripes: metal fastenings for securing a boat in its cradle; canvas bands fitted with thimbles in their ends and passed from the davit heads over and under the boat for securing for sea.

GROMMET: a ring of rope made from a single strand; also iron rings sewed into the edge of a hammock or sail.

GROUND SWELL: the swell encountered in shoal water.

GROUND TACKLE: a term used to include all of the anchor gear.

GUDGEON: a support for a rudder consisting of metal braces bolted to the sternpost and having eyes to take the pintles, or pivot pins, on which the rudder turns.

GULL: a wing of an airplane, the inner section of which has positive dihedral, the remainder having less positive dihedral, or being horizontal.

GUNSHIELD: the plating of steel protecting a gun crew from splinters.

GUNWALE (pronounced *gun -el*) : the upper edge or rail of a ship or boat's side.

GUY: a line used to steady and support a spar in a horizontal or inclined position.

GYROCOMPASS: a compass used to determine true north by means of gyroscopes.

H

HAIL: to address a nearby ship or boat.

HALF DECK: a partial deck below the main deck and above the lowest complete deck.

HALF MAST: position of the ensign when hoisted half way; used as a mark of respect for the dead.

HALYARD (HALLIARD) : a line used for hoisting a flag or sail.

HAND: a member of the ship's crew.

HAND LEAD: a lead weighing from 7 to 14 pounds secured to a lead line and used for measuring the depth of water or obtaining a sample of the bottom.

HANDLE: the part of the oar farthest inboard by which it is pulled.

HANDSOMELY: carefully; not necessarily slowly.

HANDY-BILLY: a small portable pump.

HANG FIRE: a gun charge that fires at some appreciable interval after "pulling the trigger."

HASH MARK: slang for the diagonal stripe on an enlisted man's sleeve showing a previous enlistment.

HATCH: an opening in the ship's deck for communication or for handling stores and cargo.

HAWSE: the horizontal distance from the stem of a vessel to a point in the water directly over her anchor.

Hawse pipe: an iron casting in the bow through which the anchor chain is run.

Hawser: a heavy line five inches or more in diameter used for heavy work such as towing.

Head: a ship's toilet.

Head room: clearance between decks.

Heads up: slang for "look out."

Headway: the motion of a ship forward.

Heave: to throw; to pull on a line; the rise and fall of a ship at sea.

Heave round: to revolve the drum of a capstan, winch or windlass.

Heave short: to heave in until the vessel is riding nearly over her anchor.

Heave to: to bring the ship's head into the wind or sea and hold her there by the use of engines and rudder.

Heaving line: a small line thrown to an approaching vessel or to a dock for passing larger lines.

Heel: the lower end; to list over; a vessel turns on her heel when she turns in a short space.

Heel and toe: a continuous watch stood by all members on the watch list relieving in succession.

Helm: a tiller; the gear by which the ship is steered.

Helmsman: man who steers the ship. Steersman is now the preferred name.

High seas: the entire ocean beyond the three-mile limit where no nation has special privileges or jurisdiction.

Hitch: method of securing a line to a hook, ring, spar or another line. Slang for a term of enlistment.

Hit the deck: a phrase used in rousing men from bunks at Reveille.

Hoist: a display of signal flags at the yardarm; to raise a piece of cargo or gear.

Hold: space below decks used for the storage of ballast, cargo and stores.

Holiday: a spot left unfinished in painting; a gap between sea bags on the jackstay; any imperfection in work.

House: to stow or secure in a safe place.

Hove taut: pulled tight.

Hug: to keep close to.

Hulk: a stripped or worn-out ship unable to move under her own power.

HULL: framework of a vessel together with all decks, deckhouses, inside plating or planking, exclusive of masts, yards, rigging, all equipment, and all items generally classed as superstructure.

HULL DOWN: said of a vessel when only her masts are visible above the horizon.

I

I.C.: interior communication; communications within the ship.

IDLER: a member of the ship's company having no watches.

INBOARD: toward the center line of the ship.

IN BOWS: an order to bow oarsmen to boat their oars and prepare to come alongside a vessel or dock.

INNER BOTTOM: the plating forming the top of the double bottom.

INSHORE: toward the land.

INTERCARDINAL POINTS: the four points midway between the cardinal points of a compass—northeast, southeast, southwest, northwest.

INVERTED GULL: a wing of an airplane, the inner section of which has negative dihedral, the remainder having less negative dihedral or being horizontal.

IRISH PENNANT: untidy loose end of a line.

ISLAND: superstructure containing conning tower, navigation bridge, communication platform, flying bridge, etc. on an aircraft carrier.

J

JACK: a flag similar to the union of the national ensign; a device for moving heavy pieces of equipment or cargo; a plug for connecting an electrical appliance to a power or phone line.

JACKASS: a cone-shaped canvas bag filled with oakum and forced into the hawse hole to prevent the entrance of sea water.

JACK BAR: a junction bar into which a line for power or phones is plugged.

JACK STAFF: a small vertical spar at the bow of the ship from which the jack is flown while the ship is at anchor.

JAG: abbreviation for Judge Advocate General of the Navy.

JETSOM: goods which sink when thrown overboard at sea.

JETTISON: to throw goods overboard.

JETTY: a landing wharf or pier; a dike at a river's mouth.

JEW'S HARP: a ring bolted to the upper end of the shank of an anchor, to which the bending shackle is secured.

Jib: a headsail set on a stay forward of the foremast.

Jigger: a light handy tackle for general work about the deck.

Jumper: the blouse of a bluejacket's uniform; an auxiliary water, electrical, or air line used to by-pass a broken section of line.

Jump ship: slang for leaving the ship without authority or permission.

Jury rig: a makeshift rig of mast and sail or other gear.

K

Kapok: a water-resistant fiber stuff packed into lifejackets making them buoyant.

Kedge: a small anchor used for kedging, by alternately planting it ahead and hauling ship up to it.

Keel: The backbone of a ship running from stem to sternpost at the bottom.

Keelson: a timber bolted on top of a keel used to strengthen the ship's structure.

Ketch: a sailing vessel rigged like a yawl, but with the jigger mast forward of the rudder.

Kick: the distance the stern of the ship is thrown away from the direction of a turn by the action of the rudder.

Knee: an angular piece connecting a ship's frames to the beams.

Knock off: to stop; to stop work.

Knot: one nautical mile per hour.

L

Labor: motion of a ship working heavily in a rough sea.

Ladder: a metal, wooden or rope stairway.

Landfall: first sighting of land at the end of a sea voyage.

Landing force manual: official Naval Manual. Source of information concerning tactical units and maneuvers used in carrying out landing operations on enemy territory.

Landlubber: seaman's term for one who has never been to sea.

Landmark: a conspicuous object on shore used in piloting.

Lanyard: a line made fast to an article to secure it, such as knife lanyard.

Lash: to tie or secure.

Launch: to place in the water; a kind of motor boat.

Lay: the direction of the twists of strands of a rope; a preliminary order, such as lay aloft.

Lead line: a line secured to the lead used in sounding.

Leadsman: the seaman detailed to the chains for heaving a lead.

Leather: that part of an oar resting in the oarlock, usually covered with leather.

Leave: special permission to be absent from ship or station for a period longer than 48 hours.

Lee: away from the direction of the wind.

Lee shore: the land to the leeward of the ship.

Leeward: the direction away from the wind.

Leeway: the drift of a vessel to leeward caused by wind or tide.

Left-handed rope: twisted from right to left; strands and cables are usually left-handed.

Let fall: an order to let the oars fall from the position of toss into the rowlocks.

Let go by the run: allow a line to run free.

Lie to: said of a ship when she is underway with no way on.

Liberty: permission to be absent from a ship or station for a period up to 48 hours.

Life buoy: a ring buoy made of cork used for life saving.

Life line: a line secured along the deck to lay hold of in heavy weather; a line thrown on board a wreck by a life-saving crew; a knotted line secured to the span of life boat davits for the use of the crew when hoisting and lowering.

Lighthouse: a structure, visible for some distance, placed on or near a dangerous area or on a point of land and equipped with a light which flashes in a set pattern.

Light ship: a small ship equipped with a distinctive light and anchored near an obstruction to navigation or in shallow water to protect passing ships.

Lighter: a small vessel used for discharging or loading ships anchored in harbor.

Line: the Equator; a seagoing term for light rope or cable.

Line officer: an officer who holds military authority in the chain of command, as opposed to a staff officer such as a doctor or chaplain.

List: inclination of a vessel to one side or the other due to excess weight or shifted cargo.

Lock: a compartment in a canal for lowering or raising vessels to a different level.

Log: a book containing the official record of a ship's activities, together with observations of weather conditions.

Long blast: a whistle blast of from 10 to 12 seconds' duration.

Longshoreman: a laborer who loads and unloads cargo.

Longitudinal frames: frames of a ship running fore-and-aft secured to the transverse frames furnishing support.

Lookout: a man stationed aloft or in the bow or in other parts of the ship to observe and report objects seen.

Look alive: be on the alert.

Loom: the part of an oar between the blade and the handle; the reflection of a light below the horizon.

Lubber: see Landlubber.

Lubber's line: a vertical black line marked on the inner surface of the compass bowl indicating the direction of the ship's bow.

Lucky bag: a locker for the stowage of loose articles of clothing and personal gear found about the ship.

M

Machinery compartment: all boiler rooms, engine rooms and compartments for auxiliary engines.

Magazine: compartment used for stowage of ammunition and explosives.

Main deck: the highest complete deck extending from stem to stern and from side to side.

Main battery: the biggest guns of a fighting ship.

Mainmast: the second mast from the bow of a ship having two or more masts. If a ship has but one mast, it is considered the mainmast.

Maintop: top of the mainmast, used for spotting gunfire.

Man: to put the proper number of men on a detail so that the work can be done.

Manhole: a round or oval hole cut in decks or tanks to provide access.

Mark: the call used in comparing watches, compass courses or bearings; the fathoms of a lead line which are marked; a model or type of and piece of equipment, as, "Mark IV Sight."

Marlinspike: a pointed iron instrument used in splicing line and wire.

Mast: a vertical spar supporting the booms, gaffs and sails on a sailing vessel; a spar supporting signal yard and antennae on a fighting ship; the term applied to the hearing of cases of offense against discipline, or for requests or commendations.

Masthead light: a white running light carried on the foremast or in the fore part of the ship by steam vessels under way.

Meet her: an order to shift the rudder in order to check the swing.

Mess: to eat; a group of men eating together.

Messenger: a light line made fast to a hawser for the purpose of passing the latter; the enlisted man who attends and runs errands for the Officer of the Deck.

Mil: a small angle equal to 3.44 minutes, or one yard across the line of sight for each thousand yards of range.

Misfire: a shell that fails to fire when the trigger has been pulled.

Monoplane: a single-winged airplane.

Mooring: securing a ship to a dock or buoy, or anchoring with two anchors.

Morse code: a code consisting of dots and dashes representing letters and numbers and used in radio and visual signaling.

Motor launch: a power boat from 24 to 50 feet in length, used for ship's heavy work.

Motor whaleboat: a power whaleboat used for lifeboat duty, usually 26 feet in length.

Multiple mast: an exposed mast having more than one supporting element.

Muster: to assemble the crew and call roll.

N

Nacelle: an enclosed shelter for a power plant or personnel on an airplane, usually shorter than a fuselage and does not carry the tail unit.

Nautical mile: the length of a minute of a great circle of the earth or 6,080.20 feet.

Naval stores: oil, paint, turpentine, pitch, etc., distinct from commercial stores.

Navigation: the science of conducting ships or airplanes from place to place by use of calculations based on observations of astronomical bodies.

Neptune: the mythical God of the sea.

Nest: boat stowage in which one boat is placed inside another; two or more small vessels moored together.

Nothing to the right (left): An order to the helmsman not to let the ship go to the right (left) of the course ordered.

Not under command: said of a ship when disabled and under way.

Nun buoy: a cone shaped buoy used to mark channels.

O

Oakum: a caulking material made of old tarred hemp rope fiber.

Oarlock: a device consisting of jaws and a shank which fits in a rail to hold the oar when pulling a boat; sometimes called a rowlock.

Occulting light: one in which the period of light is equal to or greater than the period of darkness.

Officer of the deck: the officer in charge of the ship during each watch and on deck as the Captain's representative.

Oilskins: garments made waterproof by repeated coats of linseed oil.

Order: a directive telling what to do but leaving the method used to the discretion of the person ordered.

Orlop: the lowest deck of a ship.

Outboard: toward the side of the vessel or outside of the vessel entirely.

Out of trim: a ship carrying a list or down by the head or the stern.

Overall: the length on deck from one end to the other.

Overhang: the projection of the ship's bow or stern beyond the stem or sternpost.

Overhaul: to separate the blocks of a tackle; to overtake a vessel.

Overhead: equivalent to the ceiling in a building.

P

Padre: affectionate slang for the chaplain.

Painter: the line in the bow of a small boat for towing or making fast.

Palm and needle: a sailor's thimble made of leather and a needle, used for sewing canvas.

Paravanes: torpedo-shaped devices which are towed on either side of a ship's bow for the purpose of deflecting and cutting mines adrift.

Parceling: wrapping a rope spirally with long strips of canvas, following the lay of the rope and overlapping like the shingles on a roof to shed moisture.

PART: to break, as of a rope.

PASSAGEWAY: a corridor or hallway on board ship.

PASS A LINE: to carry a line to or around something or reeve through and make fast.

PASS THE WORD: to repeat an order or information to the crew.

PAY: to fill the seams of a vessel with pitch or other substances.

PAY OFF: to turn the bow away from the wind; to pay the crew.

PAY OUT: to let out chain or ease off on a line.

PEACOAT: the blue broadcloth reefer worn by enlisted men of the Navy below the grade of chief petty officer.

PEAK: the topmost end of the gaff. It is at this point that the ensign is flown when the ship is underway.

PEAK TANK: ballast tanks located in the bow and stern of a ship.

PELICAN HOOK: a hinged hook which is held in place by a ring. When the ring is knocked off, the hook swings open.

PELORUS: a navigational instrument used in taking bearings; consists of two sight vanes revolving about a dumb compass, the North of which corresponds to the head of the ship.

PENDANT: a length of wire or rope with a block or thimble spliced in one end.

PERISCOPE: a device on a submarine by which the horizon can be scanned when the vessel is submerged, as if the eyes were on the horizon level.

PHONETIC ALPHABET: a way of speaking letters so that they will be clearly understood; for example, A is "Able." B "Baker," etc.

PIER: a construction work extending into a harbor with sufficient depth of water alongside to accommodate ships; usually considered to be longer than a wharf.

PIGBOAT: slang for submarine.

PILE: a pointed spar driven into the bottom and projecting above the surface of the water.

PILOT: an expert who conducts ships in and out of harbors and in dangerous waters; also a man at the controls of an airplane.

PILOTING: moving a ship from place to place, avoiding danger by reference to known landmarks, lights, ranges, soundings, etc.

PINTLES: pivot pins on which a rudder turns.

PIPE THE SIDE: the ceremony at the gangway in which side boys are drawn up and the boatswain's pipe blown when a high-ranking officer or distinguished visitor comes aboard.

PIPE DOWN: slang for "be quiet;" an order dismissing the crew from a drill.

PIVOT POINT: the point on a ship around which she turns.

PLATFORM DECKS: partial decks located below the lowest complete deck.

PLATOON: a military unit made up of three or more squads.

PLIMSOLL MARK: a mark on the side of merchant ships to indicate allowed loading depths.

POINTER: the member of a gun crew who controls the vertical elevation of the gun in aiming at a target.

POLLYWOG: one who has never crossed the Line (Equator).

POOP DECK: the partial raised deck and after structure at the stern over the main deck of a vessel.

POOPED: a term for the sea breaking over the stern of a vessel.

PORT: the left side of a ship facing forward; an opening in the ship's side; a harbor.

PRECEDENCE: the order in which officers are ranked in the chain of command; the order in which petty officers are listed.

PREVENTER: a line used for additional safety and to "prevent" loss of gear under heavy strain.

PROLONGED BLAST: a whistle blast of from 4 to 6 seconds' duration.

PROPELLER: blades, turned by a shaft, which drive the ship through the water.

PROTECTIVE DECK: the deck fitted with the heaviest protective plating.

PROW: old term for bow.

PULLS: cords used for sounding the ship's whistle or siren.

PURCHASE: a tackle consisting of blocks and falls.

Q

QUADRANT: the metal fitting on the rudder head of a ship to which the steering ropes are attached.

QUARTER: that portion of a ship's side near the stern.

QUARTER DECK: the part of the upper deck reserved for honors and ceremonies.

QUARTERING SEA: a sea on the quarter.

QUARTERS: living space; assembly of the crew of a warship; all hands assembled at established stations for review.

R

Radio direction finder: an apparatus used for taking bearings of the source of radio transmissions.

Range: distance in yards from a ship to the target; two or more objects in line to indicate the course to steer to avoid danger.

Range light: the white light on a ship's mainmast which, when used with the masthead light, indicates the direction of her course.

Rank: grade of official standing of commissioned officers.

Rate: grade of official standing of enlisted men.

Ratline: a short length of small stuff running horizontally across shrouds, used for a step.

Ready room: compartment on aircraft carrier in which pilots assemble for flight orders.

Reef: a chain or ridge of rocks, coral or sand in shallow water; to reduce the area of the sail by securing reef points.

Reeve: to pass the end of a line through any lead, such as a sheave or fair lead.

Relative bearing: the bearing of an object in relation to a definite point such as the bow of the ship.

Request mast: a mast held by the Captain or Executive Officer to hear requests for leave, liberty, etc.

Ribs: the frames of a ship to which the sides are secured.

Ride: to lie at anchor; to ride out a storm.

Riding lights: lights carried by a ship at anchor or moored.

Rig: a general description of a ship's upper works; to set up spars or to fit out.

Rigging: lines securing masts and sails.

Right: to return to normal position.

Right-handed line: line which is twisted from left to right, or clockwise.

Roaring forties: the geographical belt located between the 40th and 50th parallels of latitude, in which are encountered the prevailing or stormy westerlies.

Rocks and shoals: slang for Articles for The Government of the Navy.

Ropeyarn sunday: a time for repairing clothing.

Rouse in: to haul in, usually by man power.

Rudder: a flat, vertical structure attached to the stern and connected with appropriate gear to steer the ship.

Rules of the road: regulations prescribed to prevent collisions of ships.

Running lights: lights required by law which are carried by a ship under way.

S

Sail ho: a hail from a lookout to indicate that a ship has been sighted.

Salvage: to save a ship or cargo from danger; money paid for saving a ship or cargo.

Screw: propeller.

Scull: to move a boat by working an oar from side to side over the stern.

Scupper: openings in the side of the ship to carry off water.

Scuttle: a small trunk in the ship's deck; to sink a ship by boring holes in her bottom or by opening sea valves.

Scuttle butt: a container of fresh water for drinking purposes used by the crew; a rumor.

Sea anchor: a drag thrown over to hold a vessel's head into the wind and sea.

Sea bag: a large canvas bag for stowing the gear of a bluejacket.

SeaBees: construction battalions of the Navy; nickname for bluejackets in a construction battalion.

Sea dog: an old sailor.

Sea keeping: the ability of a ship to stay at sea for long periods of time.

Sea ladder: a rope ladder with wood steps for use over the side.

Sea lawyer: a seaman who is prone to argue, especially against recognized authority.

Sea room: far enough away from land for unrestricted movement.

Sea way: a place where a moderate or rough sea is running.

Seaworthy: capable of putting to sea and meeting usual sea conditions; refers to a ship that can stand heavy seas.

SecNav: abbreviation for Secretary of the Navy.

Second deck: a complete deck next below the main deck.

Secondary battery: the guns of lesser caliber than the main battery used against surface ships.

Secure: to make fast; to tie; safe; order given on completion of a drill or exercise on board ship.

Sennit: braided rope yarn or spun yarn.

Serving: additional protection over parceling consisting of continuous round turns of serving stuff.

Set: direction of the leeway of a vessel, or of a tide or current.

Set taut: an order to take in the slack and take a strain on running gear before heaving it in.

Set the course: to give the helmsman the desired course to be steered.

Shackle: a U-shaped piece of iron or steel with eyes on the ends closed by a shackle pin.

Shakedown cruise: cruise of a newly commissioned ship to test out all machinery and train the crew.

Sheave: the grooved pulley wheel in a block.

Sheer line: the longitudinal upper curve of the deck.

Sheer off: to turn the ship suddenly away.

Sheet: the rope used to spread the clew of head sails and to control the boom of boom sails.

Shellback: a man who has crossed the Equator and been initiated.

Shell room: a compartment provided for the stowage of projectiles.

Ship: a vessel of large size capable of carrying boats.

Shipshape: seamanlike and neat.

Shore patrol: a detail of men on duty in ports or cities where large numbers of enlisted men are on liberty and charged with maintaining discipline and assisting local police in preserving the peace and order among Naval or military personnel.

Shore up: to prop; reinforce.

Short blast: a whistle blast of about one second's duration.

Shot: a short length of chain, usually 15 fathoms; slang for an injection.

Shove off: slang for leaving; an order to the boat crew to shove the boat clear before leaving a dock or ship's side.

Shroud: side stay of hemp or wire running from the masthead to the rail to give support to the mast.

Sick bay: ship's hospital or dispensary.

Side boys: the men manning the side in honor of visiting officers or distinguished visitors.

Side lights: the red and green running lights carried on the port and starboard sides, respectively.

Signal bridge: the bridge on which visual signals and dispatches are sent and received.

Skipper: slang for the Captain.

Skivvies: slang for underwear.

Slack: the part of a line hanging loose; to ease off; state of the tide when there is no horizontal motion.

Slings: the fittings for hoisting a boat or other heavy lift by crane or boom.

Small stuff: small cordage designated by the number of threads or by special names, such as marline, ratline stuff, etc.

Smart: snappy, seamanlike.

Smoking lamp: a lamp used aboard old ships to indicate when men could smoke; the expression, "the smoking lamp is lit," means permission is given to smoke.

Snub: to check suddenly.

Sound: to measure the depth of water by means of a lead line or sounding machine. Oil tanks, voids and blisters are also sounded to determine the depth of liquids contained in them.

Sound powered phone: a phone powered by voice; standard battle phone.

Span: a line made fast at both ends with a purchase hooked to its bight; a wire rope between davit heads and set up by a turnbuckle.

Spar: a term applied to a pole serving as a mast, boom, gaff, bowsprit, etc. Spars are made of either steel or wood.

Spar buoy: long, thin wooden spar used to mark channels.

Speed cone: a cone-shaped signal used in formation to indicate engine speed.

Speed light: the light at the after truck of a warship showing white or red, indicating changes in speed.

Spit kit: cuspidor.

Splice: to join two lines together by tucking the strands of each into the other.

Splinter deck: the deck fitted with the lightest protective plating.

Splinter screen: a protective plating around a gun mount.

Spring: a mooring or docking line leading at an angle of about 45 degrees from the center line of the vessel; to turn a vessel with a line.

Squad: the smallest military unit, consisting of from 8 to 12 men.

Squall: a sudden violent gust of wind.

Square away: to get things settled down or in order; to complete a job.

Squilgee (Squeegee): a deck drier made of a flat piece of wood with a rubber blade and a handle.

Stabilizer: the fixed horizontal tail surface of an airplane as distinguished from the fixed vertical surface.

Stack: the smoke pipe of a ship.

Stadimeter: an instrument for measuring the distance of an object when its height is known.

Staff officer: an officer whose duties are special rather than military, such as a doctor or chaplain.

Stage: a platform rigged over the side of the ship for painting or repair work.

Stanchion: a wood or metal upright used as a support.

Stand by: a preparatory order meaning "get ready."

Standard speed: a speed set by the officer in command of a unit.

Standing rigging: the heavy wire ropes which support spars or masts and which are permanently secured.

Starboard: the right side of a ship looking forward.

Station bill: a bill listing stations of the crew at emergency drills and other ship-board evolutions.

Stay: a piece of rigging, either wire or hemp, used to support a mast.

Steady: an order to the helmsman to hold the ship on the course.

Steerage: junior officers' quarters.

Steerage way: the slowest speed at which a vessel can be steered.

Steersman: man who steers the ship.

Stem: the timber at the extreme forward part of a ship secured to the forward end of the keel supporting the bow planks.

Stern: the after part of a ship.

Stern sheets: the space in a boat abaft the afterthwart.

Sternway: movement of a ship in the direction of the stern.

Stopper: a short length of line secured at one end, and used in securing or checking a running line.

Stow: to put gear in its proper place.

Straggler: a man absent from duty without permission.

Strake: a continuous line of planks or plates running the length of the ship.

Strand: part of a line made up of yarns.

Stream anchor: an anchor of medium weight usually carried at the stern of a ship.

Striker: a non-rated man who is qualifying for a petty-officer's rate.

Strip ship: to prepare the ship for battle action by getting rid of any unnecessary gear.

Strut: the support from wing to fuselage or from wing to wing on an airplane; support, fitted with bearing, for external portion of propeller shafts.

Submersible pump: an electrically driven pump that can be lowered into a flooded compartment.

Suctions: to take suction; to pump out.

Superstructure: all equipment and fittings except armament extending above the hull.

Superstructure deck: a partial deck higher than the main, forecastle, and poop deck, and not extending out to the side of the ship.

Swab: a rope mop.

Swamp: to sink by filling with water.

Sweep back: term applied to a wing of an aircraft whose leading and trailing edges are farther aft at the tips than at the center.

Swell: the heave of the sea.

Swing ship: moving the ship through the points of the compass to check compass error for making a deviation table.

Swivel: a metal link with an eye at one end fitted so as to permit rotation and thus keep turns out of a chain.

T

Tackle (pronounced *take'-'l*): a purchase composed of blocks and lines.

Taffrail: a rail at the stern of a ship.

Tail on: an order to take hold of a line and haul away.

Take a turn: to pass a turn around a belaying pin or cleat and hold on.

Tampion: a wooden plug placed in the muzzle of a gun to keep dampness out; also sometimes spelled "Tompion."

Taper: a gradual diminishing of the length or thickness of an airplane wing or other object.

Tarpaulin: a heavy treated canvas used as a protective covering.

Taut: with no slack; strict as to discipline.

Telephone talker: a man who mans a battle telephone.

Tend: to man; the direction the cable leads when a ship is anchored.

Tender: a vessel that supplies and repairs ships or aircraft.

Thimble: an iron ring grooved on the outside for a rope grommet.

Thole pin: a pin fitted in the gunwale capping for use in place of an oarlock.

Thwart: the cross piece used as a seat in a small boat.

Tiller: a short piece of iron or wood fitted into the head of the rudder by which it is turned.

Toggle: a wooden or metal pin slipped into a becket and used for separating or securing gear.

Topping lift: a line used for topping a boom and taking its weight.

Topside: above decks.

Tow: to pull a vessel through the water.

Towing spar: a spar towed by a ship in a fog as an aid to the ship next astern in column.

Tracking: to follow the target by moving the point of aim of a gun.

Train: the supply and repair ships of a fighting fleet.

Trainer: the member of a gun crew who controls the horizontal movement of the gun in aiming it at a target.

Transom: an athwartship timber bolted to the sternpost.

Trice: to haul up.

Trick: a period of time during which the helmsman is at the wheel.

Trim: the angle to the horizontal at which a vessel rides; to handle the sheets so as to make the most of the wind; shipshape.

Trip: to let go.

Truck: a flat circular piece of wood secured at the top of the highest mast or at the top of the flagstaff.

Turbine: a high speed rotor turned by steam which furnishes motor power.

Turn to: an order to begin work.

Turn turtle: capsize.

Turnbuckle: a metal appliance consisting of a thread and screw capable of being set taut or slacked and used for setting up standing rigging.

Turret: a heavily armored housing containing up to four main battery guns and extending downward through the decks and including ammunition handling rooms and hoists.

Two blocked: the condition when the two blocks of a tackle have been drawn together as close as possible by hauling on a fall; a pennant or flag hauled to the top of the flagstaff or hoist.

Two thirds speed: two thirds of standard speed.

U

UNCOVER: remove hat.

UNDER WAY: a vessel is said to be under way when she is not at anchor nor made fast to the shore, nor aground.

UNDERCARRIAGE: the landing gear of an airplane.

UNDERTOW: a seaward current near the bottom in heavy surf.

UNIFORM OF THE DAY: the uniform prescribed by the commanding officer to be worn at a particular time.

UP ANCHOR: an order to heave up the anchor and get under way.

UP BEHIND: an order to cease pulling and slack up roundly so that the gear may be belayed.

UP OARS: an order to raise the oars from the boat to a position of toss.

UPPER DECK: a partial deck above the main deck amidships.

V

'VAST: see Avast.

VEER: to pay out chain or line; when the wind changes direction clockwise or to the right it is said to veer.

VERY'S SIGNAL: a night signal consisting of red, white or green stars fired from a Very's pistol.

VERY WELL: reply of an officer to a subordinate to indicate that the information given is understood.

VOID: an empty space inside the armor belt for protection and for control of list and trim.

W

WAIST: the amidships portion of the ship; the part of the deck between the forecastle and the poop.

WAKE: the track or trail in the water which a vessel leaves behind.

WALK BACK: an order to keep the gear in hand but walk back with it towards the belaying point.

WARDROOM: officers' assembly and mess room aboard a warship.

WARNING HOWLER: a siren or horn used to sound emergency alarms aboard ship.

WARP: to move a vessel by a line or anchor, as "warp the ship into the slip."

WARRANT OFFICER: a classification of rank between Chief Petty Officer and the lowest rank of regularly commissioned officer. A Chief Warrant Officer ranks "with but after" an Ensign.

Watch: a post or period of duty.

Watch cap: knitted wool cap worn by seamen on watch; a canvas cover placed over a funnel when not in use.

Watch, Quarter and Station Bill: a list or chart giving the watch duties, billet and emergency or battle station of every man aboard ship.

Water breaker: drinking water cask carried in ships' boats.

Waterline: the point to which the ship sinks in the water; a line painted on the hull showing the point to which the ship sinks in the water when properly trimmed.

Water-logged: filled or soaked with water, but still afloat.

Watertight integrity: the system of keeping the ship afloat through maintaining the watertightness of undamaged compartments.

Waterway: gutter at the side of a ship's deck to carry water to the scuppers.

Way enough: indicates sufficient speed to accomplish a maneuver; an order to finish the stroke, toss and boat the oars.

Weather: exposed to wind and rain; to the windward.

Weather deck: the portion of the main, forecastle, poop and upper decks which is exposed to the elements.

Weather-eye: to keep a weather-eye is to be on the alert.

Weigh: to lift the anchor off the bottom.

Whaleboat: a sharp-ended lifeboat, pulled by oars or fitted with sails; when equipped with motor it is called a motor whaleboat.

Wharf: a dock; a water's edge structure alongside which a ship may be tied up for loading, unloading or minor repairs.

Wheel: the circular frame with which the steersman controls the rudder.

Where away: answering call requesting the location of an object sighted by a lookout.

Wherry: a small pulling boat, 12 or 14 feet long, used by officers.

Whipping: keeping the ends of a line or rope from unlaying by wrapping with turns of twine and tucking the ends.

Wide berth: plenty of clearance, as in passing another ship.

Wig wag: a flag signaling code in which one flag is used to indicate the dots and dashes of the Morse code, now largely replaced by semaphore.

Wildcat: specially formed drum on the anchor windlass to hold and pull the links of anchor chain.

WINCH: hoisting engine secured to the deck, used to haul lines and wire ropes by turns around a horizontally turning drum.

WINDLASS: engine-driven horizontal or vertical drums for hauling in lines or cables.

WINDWARD: into the wind; toward the direction from which the wind is blowing.

WIND SHIP: to turn a ship end for end, usually with lines at a pier.

WING: the main horizontal surface of an airplane which supports it in flight.

WITH THE SUN: in a clockwise direction; the proper direction in which to coil a line.

WORMING: filling the lays of a line preparatory to parceling and serving.

Y

YARD: a spar attached at the middle to a mast and running athwartships, used as a support for square sail, signal halyards or signal lights; shipbuilding and repair depot for Navy vessels—as Boston Navy Yard.

YARDARM: the outboard end of a yard.

YARDARM BLINKER: a signal light carried on the yardarm and flashed on and off to send messages in code.

YARN: twisted fibers used for rough seizings, and which may be twisted into strands; adventure story—to "Spin a yarn."

YAW: to steer badly, zigzagging back and forth across the intended course.

YOKE: the piece fitting across the head of a small boat rudder, to the ends of which the steering lines are attached.

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